THE EFFECTIVENESS OF THE TEAM EDUCATION ADVANCING COLLABORATION IN HEALTHCARE (TEACH!) CURRICULUM IN INTERPROFESSIONAL COLLABORATIVE COMPETENCY ATTAINMENT AMONG PROFESSIONAL ATHLETIC TRAINING STUDENTS

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For my Mom, a promise fulfilled.

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THE EFFECTIVENESS OF THE TEAM EDUCATION ADVANCING COLLABORATION IN HEALTHCARE (TEACH!) CURRICULUM IN INTERPROFESSIONAL COLLABORATIVE COMPETENCY ATTAINMENT AMONG PROFESSIONAL ATHLETIC TRAINING STUDENTS

Current accreditation standards require that planned interprofessional education (IPE) be implemented into the curricula of professional athletic training programs. The TEACH! curriculum is a unique IPE strategy that addresses the IPEC core competencies through multiple large-scale learning events. For this study, I conducted a secondary analysis of ICCAS data from professional athletic training students at Indiana University-Bloomington following their completion of the TEACH! curriculum. Retrospective pre and post-assessment scores were compared across the population, and among sub-groups of the population based on learning environment, gender, and race/ethnicity. Results indicate that participants interprofessional collaborative competency significantly improved after completing the TEACH! curriculum. Additionally, learning environment, gender and race/ethnicity had no influence on interprofessional collaborative competency attainment. Accordingly, the TEACH! curriculum appears to be an effective strategy for developing interprofessional collaborative competency in professional athletic training students.

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Chapter 1: Introduction

Athletic training is a relatively new health care profession, having only been officially recognized by the American Medical Association (AMA) since 1990 (Delforge & Behnke, 1999). As the field has evolved, athletic trainers' have made great strides in gaining credibility in the health care community as viable allied health care professionals. A critical component in maintaining this credibility is possessing skills to effectively collaborate with peer health care providers. Subsequently, providing athletic training students with the skills to effectively work with providers in peer health care professions is essential to the long-term viability of the field (Breitbach & Richardson, 2015). This need for effective collaboration is not unique to athletic training. Many health care professions have recognized the importance of collaborative care, and have begun to implement interprofessional education (IPE) into their curricula. According to the World Health Organization (WHO), IPE occurs when students from two or more professions learn about, from and with each other to enable effective collaboration and improve health outcomes (WHO, 2010). In athletic training, developing collaborative skills has been particularly challenging as IPE has been historically absent from the curricula of professional athletic training programs (Rizzo, Breitbach & Richardson, 2015). However, this is set to change as the profession has placed renewed emphasis on collaborative practice. In the *2020 Standards for Accreditation of Professional Athletic Training Programs* the Commission on Accreditation of Athletic Training Education (CAATE) requires that planned interprofessional education be incorporated throughout the curriculum (CAATE, 2020). Effective July 1st, 2020, all professional athletic training programs are now required to incorporate IPE in their curricula via this accreditation mandate. Nonetheless, IPE remains somewhat of an enigma for athletic training educators. Very little scholarship exists in the field related to interprofessional collaboration in clinical practice, or pedagogical strategies

for IPE. Accordingly, there is no consensus on what constitutes best practices for IPE in athletic training education. Thus, developing and implementing IPE has been particularly challenging for athletic training faculty and administrators (Breitbach et al., 2018).

The purpose of IPE is to develop collaborative skills toward the end of improving interprofessional collaborative practice (IPCP). IPCP is described as a partnership between a team of health providers, and a client in a participatory collaborative, and coordinated approach to shared decision making around health and social issues (Orchard et al., 2010). Effective IPCP is associated with reducing preventable injury and illness, decreasing morbidity and mortality rates, and optimizing evidence-based treatments (Bosch & Mansell, 2015). Improvements in IPCP have also been shown to provide benefits to the health care provider including reducing workload strain, and increasing job satisfaction (Bosch & Mansell, 2015). Efforts toward improving IPCP is also critical in addressing the disparities in health and health care that exist in the United States (Maina et al., 2018). Evidence suggests that health care provider bias, both explicit and implicit, plays a significant factor in the inequities of health care delivery and patient outcomes (Maina et al., 2018). IPCP that embraces the diverse roles and responsibilities of others can begin to mitigate the detrimental effects of health care provider bias. Accordingly, the WHO has identified IPCP as an essential component in strengthening health systems, improving health outcomes, and mitigating the global health workforce crisis (WHO, 2010).

IPE in health care education has traditionally taken one of two forms; courses focused exclusively on IPE (Reubling et al., 2014), or single, large-scale IPE learning events (Rosenfeld, Oandasan & Reeves, 2011). Evidence suggests that these methods are successful in improving students understanding of the roles and responsibilities of peer health care professionals (Rosenfeld, Oandasan & Reeves, 2011), and understanding the importance of collaborative

practice (Reubling et al., 2014). However, there is very little evidence as to how these strategies influence other areas of interprofessional collaborative competency such as values and ethics, teams and teamwork, and interprofessional communication.

One new and innovative IPE strategy is the Team Education Advancing Collaboration in Healthcare (TEACH!) curriculum. The TEACH! is a longitudinal curriculum that students in the Indiana University Schools of Dentistry, Richard M. Fairbanks School of Public Health, Health and Human Sciences, Medicine, Nursing (Bloomington), Optometry, School of Public Health, the IUPUI School of Nursing (Indianapolis and Ft. Wayne), the Purdue College of Pharmacy, and Butler College of Pharmacy complete over the course of their professional degree program (IU IPEC, 2020). This curriculum was developed by the Indiana University Center for Interprofessional Practice and Education Advisory Committee, which is comprised of representative faculty from the aforementioned schools and programs. The curriculum is based on the four Interprofessional Education Collaborative (IPEC) core competencies which include: (1) values and ethics for interprofessional practice; (2) roles and responsibilities of health care providers; (3) interprofessional communication skills; and (4) teams and teamwork in health care (IEC, 2016). These competencies are universally accepted as the essential knowledge, skills, abilities, and behaviors deemed critical to successful interprofessional collaboration (IEC, 2016).

The TEACH! curriculum incorporates the IPEC core competencies throughout six, progressive, large-scale IPE experiences referred to as learning anchors. Each anchor requires health care students from a variety of disciplines to work together through mock scenarios while implementing interprofessional collaborative skills. The TEACH! curriculum is unique because it incorporates all of the IPEC core competencies uniformly through multiple, progressive, large-

scale learning events, as opposed to only addressing one core competency at a time through an IPE specific course, or a single, large-scale event.

Another unique aspect of the TEACH! curriculum is its ability to adapt to an ever-changing health care landscape. In academic year 2019-2020, the novel coronavirus (COVID-19) caused a global pandemic that significantly reduced face to face interactions and forced health care into the virtual environment. In response, the IU IPEC adapted anchors three and four to be delivered virtually through the learning management system Canvas. While the content and requirements of anchors three and four remained unchanged, participants were required to interact with one another virtually. Globally, the pandemic expedited the emergence of virtual health care and reshaped how health care professionals collaborate with each other, and with patients. Accordingly, interprofessional collaborative skills must now be adaptable to both a traditional face to face environment and a virtual environment. An inherent strength of the TEACH! curriculum has been its ability to rapidly adapt to these changes and embrace the changing health care environment.

The incorporation of the TEACH! curriculum within the professional athletic training program at Indiana University-Bloomington is rare. Few other professional athletic training programs have the capacity to offer students such a comprehensive IPE experience. To date, there is no evidence measuring the effectiveness of the TEACH! curriculum in developing interprofessional collaborative competency attainment, nor is there evidence related to professional athletic training student's participation in an IPE experience of this magnitude. Therefore, the purpose of this study was to assess the effectiveness of the TEACH! curriculum in interprofessional collaborative competency attainment among professional athletic training students.

Problem Statement

Interprofessional education (IPE) has been historically absent from professional athletic training program curricula (Breitbach & Richardson, 2015). Effective July 1st, 2020, the incorporation of IPE into program curricula is now required via accreditation mandate (CAATE, 2020). Presently, little scholarship exists related to IPCP and IPE in the athletic training literature, and thus there is no consensus regarding best practices for IPE. As athletic training educators and administrators begin to implement IPE into their curricula, evidence regarding the efficacy of IPE strategies is needed. The TEACH! curriculum is a promising IPE strategy that implements interprofessional collaborative competency through a progressive sequence of large-scale learning events (IU IPEC, 2020). Participation in the TEACH! curriculum by the professional athletic training program at Indiana University-Bloomington is rare as few other programs incorporate IPE into their curricula to this extent. To date, no evidence exists on the effectiveness of the TEACH! curriculum in providing interprofessional collaborative competency attainment among professional athletic training students.

Study Purpose

The purpose of this study was to measure interprofessional collaborative competency attainment in professional athletic training students after participation in the TEACH! curriculum.

Research Questions

How effective is the TEACH! curriculum in developing interprofessional collaborative competency among professional athletic training students?

- How does gender and race /ethnicity influence professional athletic training student's assessment of their interprofessional collaborative competency?

- How does learning environment influence professional athletic training student's assessment of their interprofessional collaborative competency?

Study Significance

This study is significant several ways. First, strong IPCP is understood to contribute to improved health outcomes for patients, provide better work experiences for health care providers, and mitigate health care provider bias (Bosch & Mansell, 2015; Maina et al., 2018). IPE in health care education programs is understood to be the primary mechanism for improving IPCP. The TEACH! curriculum is a promising, yet under investigated, IPE strategy. Therefore, this study can help determine if the TEACH! curriculum is an effective, and therefore worthwhile, addition to health care education curricula. Further, there is very little scholarship regarding IPCP and IPE in the athletic training field. Only a few studies have examined strategies for IPE in professional athletic training programs, none of which have investigated an IPE experience as extensive as the TEACH! curriculum. This study therefore serves as a significant contribution to the body of literature regarding IPE in the athletic training field.

This study is also significant as it is one of the first to take into account gender and race/ethnicity as a variable in student learning The gender and racial/ethnic identity of health care providers has been demonstrated to contribute to explicit and implicit bias in health care. The positionality of students based on their gender and racial/ethnic identity during IPE experiences may therefore affect their ability to collaborate with others and develop interprofessional skills. This study can help athletic training educators understand how student's gender and racial/ethnic identity affect their self-assessed interprofessional collaborative competency attainment.

Finally, the COVID-19 global pandemic in academic year 2019-2020 changed the manner in which participants experienced the TEACH! curriculum. In academic year 2018-2019, participants completed the TEACH! curriculum entirely in a face to face environment. However, due to the pandemic, participants in the 2019-2020 academic year completed anchors three and four in a virtual environment through the learning management system Canvas. This change allowed for the comparison of learning environments in the TEACH! curriculum. As health care continues to move into the virtual environment, developing interprofessional collaborative competency that can translate across multiple modes of interaction is important. This study is significant as it can help determine if the virtual learning environment is as conducive to collaborative competency attainment as the traditional face to face environment.

Definition of Terms

Athletic Training - Athletic training encompasses the prevention, examination, diagnosis, treatment and rehabilitation of emergent, acute or chronic injuries and medical conditions. Athletic training is recognized by the American Medical Association (AMA), Health Resources Services Administration (HRSA) and the Department of Health and Human Services (HHS) as an allied health care profession (NATA, 2020)

CAATE – The Commission on Accreditation of Athletic Training Education. The specialized accreditation agency for athletic training education programs.

Competency - Measurable knowledge, skills, abilities, and behaviors deemed critical to successful performance. Competencies as applied to health professions education programs describe what graduates have to be able to do consistently in unsupervised practice; as compared to what they know or are capable of doing with facilitation or under supervision, such as occurs during early training experiences (Fernandez et al, 2012).

HPAC – Health Professions Accreditors Collaborative. A collaborative of health professions accreditors formed to enhance accreditors' ability to ensure graduates of health profession education programs are prepared for interprofessional collaborative practice.

ICCAS – The Interprofessional Collaborative Competency Attainment Scale. A valid and reliable survey instrument for assessing interprofessional competency attainment

IPCP – Interprofessional Collaborative Practice. A partnership between a team of health providers, and a client in a participatory collaborative, and coordinated approach to shared decision making around health and social issues (Orchard et al., 2010)

IPE – Interprofessional Education. IPE occurs when students from two or more professions learn about, from and with each other to enable effective collaboration and improve health outcomes (WHO, 2010)

IPEC – The Interprofessional Education Collaborative. A collaborative of organizations that represent higher education in allopathic and osteopathic medicine, dentistry, nursing, pharmacy, and public health. The IPEC created core competencies for interprofessional collaborative practice to guide curricula development across health professions schools.

NAM – The National Academy of Medicine. Formerly known as the Institute of Medicine (IOM), one of three academies that make up the National Academies of Sciences, Engineering, and Medicine (the National Academies) in the United States. Operating under the 1863 Congressional charter of the National Academy of Sciences, the National Academies are private, nonprofit institutions that work outside of government to provide objective advice on matters of science, technology, and health (NAM, 2019).

NATA – The National Athletic Trainers' Association. The professional membership association for the athletic training profession.

TEACH! - The Team Education Advancing Collaboration in Healthcare curriculum. A longitudinal IPE curriculum that students in the Indiana University Schools of Dentistry, Fairbanks School of Public Health, Health and Rehabilitation Sciences, Medicine, Nursing, Optometry, Bloomington School of Public Health, and Purdue College of Pharmacy complete over the course of their professional degree program (IU IPEC, 2019).

WHO – The World Health Organization. A specialized agency of the United Nations that is concerned with international public health.

Study Design

This study was a secondary analysis of data collected from students enrolled in their final year of the professional athletic training program at Indiana University-Bloomington in academic years 2018-2019 and 2019-2020. After participating in four anchors of the TEACH! curriculum, participants self-assessed their interprofessional collaborative competency attainment via the Interprofessional Collaborative Competency Attainment Scale (ICCAS). The ICCAS is a post-program data collection strategy in which post-test, and retrospective pre-test data are collected following an IPE learning event. The ICCAS was administered to participants by staff from the Indiana University Interprofessional Practice and Education Center following anchor four of the TEACH! curriculum. Data from professional athletic training students in the aforementioned cohorts was collected and analyzed to determine changes in self-assessed competency attainment prior to, and following, completion the TEACH! curriculum.

Organization of the Study

Following this introduction, the proceeding sections will outline the current literature on IPCP and IPE, the methodological approaches employed for this study, the results of data analysis, and a discussion of the findings. In chapter two, the literature pertaining to IPCP and

IPE in the athletic training field will be appraised, along with the barriers and challenges for implementing IPE in athletic training program curricula. Additionally, the current perceptions of IPCP among practicing athletic trainers will be examined, and linked to the need for effective IPE in athletic training education. Next, the history and evolution of IPE in the United States will be explored as well as the increasing importance of IPCP in health care. Current IPE strategies in peer health care professions will be critiqued along with barriers and challenges faculty and administrators face in implementing IPE. The format and sequence of the TEACH! curriculum will be outlined including how and where the IPEC core competencies are embedded within the curriculum. Chapter three will outline the methodology of this study. Participants will be described along with how the TEACH! curriculum is mapped within the curriculum of the professional athletic training program at Indiana University-Bloomington. The ICCAS instrument will be described including the validity and reliability of the scale, along with the benefits and challenges of the retrospective pre-post design. Additionally, the procedures used for collecting and analyzing data will be described. Chapter four will provide the results of the statistical analysis, and chapter five will discuss the meaning and ramifications of the results as they pertain to interprofessional education in the athletic training field.

Chapter 2: Literature Review

Scholarship pertaining to interprofessional collaborative practice (IPCP) and interprofessional education (IPE) in the athletic training field has been historically scarce. Only recently have scholars begun to examine the perceptions of IPCP among practicing athletic trainers, and evaluate strategies for implementing IPE into athletic training curricula. Literature regarding IPE in peer health care professions is more robust. Critical examination of the IPE literature in peer professions is therefore invaluable as the athletic training profession begins to adopt IPE. In the first half of this chapter I will examine the history and evolution of IPE in athletic training education along with the perceptions of IPCP among practitioners in the field. Next, I will evaluate IPE strategies that have been used in professional athletic training programs, their efficacy, and the unique challenges athletic training educators face implementing IPE. In the second half of this chapter I will explore the historical evolution of IPE in peer health care fields, and existing IPE strategies in peer health care education programs. Additionally, I will compare and contrast the barriers and challenges faculty and administrators have faced in implementing IPE in peer health care education programs with those experienced by athletic training educators. I will conclude the chapter by discussing the development of the IPEC core competencies, along with development, structure, sequence and assessment methods used in the TEACH! curriculum.

IPE in Athletic Training

The field of athletic training is fairly new within the health care landscape of the United States. Officially organizing as a profession in 1950, the field did not become recognized by the American Medical Association as an allied healthcare profession until 1990 (Delforge & Behnke, 1999). Today, athletic trainers are included among a diverse array of allied health care

providers offering a unique set of skills, to a variety of patients, in a multitude of practice settings (Rizzo, Breitbach & Richardson, 2015). Demand for athletic trainers is expected to increase as people become more aware of the effects of sport-related injuries (Bureau, 2019). Specifically, the ability to diagnose and manage sport related concussion, and work in previously underserved areas like the industrial setting, and the military, have created a unique niche' for the athletic trainer in the health care work force (Bureau, 2019). In fact, the US Department of Labor's Bureau of Labor Statistics rates athletic training as one of the fastest growing job markets, with a projected increase of 19% from 2018-2028 (Bureau, 2019).

Athletic trainers have faced many challenges in garnering respect as allied health care providers (Rizzo, Breitbach & Richardson, 2014). Arguably the biggest challenge the profession has faced is educating peer health care providers about their knowledge and skills. In a 2014 report, Rizzo, Breitbach and Richardson (2014) argue for athletic trainers to have a larger presence among peer health care providers as interprofessional collaborative practice is implemented into health care curricula. The report provides stakeholders in the interprofessional community with a brief synopsis of the profession, their skills and abilities, and the steps they have taken to be effective contributors to the health care team (Rizzo, Breitbach & Richardson, 2014). Two years later, Breitbach (2016) followed up on this report, with a report on the growth of interprofessionalism in athletic training. In this report, Breitbach (2016) updates the interprofessional community on the pertinent changes the athletic training field has taken in regard to interprofessionalism. Notably, Breitbach (2016) acknowledges the professions IPE white paper (Breitbach & Richardson, 2015), and the changes in accreditation (CAATE, 2019) to highlight the progressive steps the profession has taken to address collaborative practice.

Another challenge the athletic training profession has faced is understanding the knowledge, skills and abilities of *other* health care professions. Understanding, and respecting, the roles of peers is equally important as being understood themselves if athletic trainers are to continue to be valued members of the health care team. For athletic training education programs, implementing effective IPE strategies that focus on mutual understanding of roles and responsibilities is therefore imperative to the long-term viability of the field (Rizzo, Breitbach & Richardson, 2015). In a commentary in the Athletic Training Education Journal regarding the place of the athletic training profession within the health care landscape, and the challenges athletic training education faces in higher education, Dr. David Perrin notes the importance of including interprofessional education into the curricula of athletic training programs. As a higher education administrator, he reveals how essential it is for athletic training to "have a seat at the table" when jockeying for resources, and gaining respect in academic institutions (Perrin, 2015). He goes on to highlight how participating in interprofessional education not only develops interprofessional collaborative skill in students, but also how it makes the athletic training profession visible among an increasingly diverse array of allied healthcare providers (Perrin, 2015).

History and Evolution of IPE in Athletic Training

Following the development of the IPEC core competencies in 2011, stakeholders in the athletic training field began to take account of their own involvement in IPE (Rizzo, Breitbach & Richardson, 2015). In June 2012, the National Athletic Trainers' Association's (NATA) Board of Directors approved a proposal from the Executive Committee for Education (NATA ECE) regarding the future direction of athletic training education (Brown, 2012). One recommendation was that interprofessional education (IPE) be a required component in the curricula of

professional athletic training education programs (ECE, 2012). In response, the profession's specialized accrediting body, the Commission on Accreditation of Athletic Training (CAATE), revised the *Standards for the Accreditation of Professional Athletic Training Programs* to address IPE. The *Standards* are used to guide athletic training programs in preparing entry-level athletic trainers (CAATE, 2019a). Inclusive of 110 standards, they provided specific requirements that all athletic training programs in the US must adhere to in the development, evaluation, analysis, and maintenance of their programs (CAATE, 2019a). Each institution is responsible for demonstrating compliance with the *Standards* to obtain and maintain recognition as a CAATE-accredited professional athletic training program (CAATE, 2019a). Although the *Standards* establish minimum academic requirements, institutions are encouraged to develop sound innovative educational approaches that substantially exceed the minimum (CAATE, 2019a). In regard to IPE, standard number 44 was updated to read, "Students must interact with other medical and health care personnel" (CAATE, 2019a). Although this standard *implies* IPE, the vague nature of the language left interpretation and compliance with this standard to the discretion of individual programs. While many programs were positioned to meet minimal compliance, few had the faculty buy-in and institutional support to substantially exceed the minimum as it related to IPE (Kraemer & Kahanov, 2014). As a result, the quantity, and quality of IPE across athletic training programs has remained inconsistent. (Kraemer & Kahanov, 2014).

In an effort to provide the athletic training field with direction and clarity regarding IPE, the NATA ECE assembled a working group of twenty-two athletic training educators in 2013 to write the white paper, *Interprofessional Education and Practice in Athletic Training* (Breitbach & Richardson, 2015). The paper surmised that the inclusion of IPE into the curricula of athletic training programs is an essential step in the professions ongoing quest to be seen as true health

care providers by other health care professions, and the public in general (Breitbach & Richardson, 2015). Additionally, the paper provided the profession and other stakeholders with background information on IPE and IPCP, and presented model pedagogy that could be implemented in professional athletic training programs (Breitbach & Richardson, 2015). Further, the paper predicted that there were several barriers to successful implementation of IPE in athletic training. In terms of institutional support, there was believed to be a dearth of financial resources, and administrative support at many institutions to foster effective long term implementation of IPE (Breitbach & Richardson, 2015). From a pedagogical perspective, there appeared to exist a true lack of knowledge regarding IPE, and IPCP by athletic training faculty (Breitbach & Richardson, 2015). Additionally, ignorance of IPE, and the inability to identify and build working relationships with faculty from other healthcare disciplines, created a lack of buy-in and skepticism toward IPE among faculty (Breitbach & Richardson, 2015).

As the white paper predicted, implementing IPE into an already saturated curriculum was initially met with skepticism and resistance from faculty. In an editorial entitled *Interprofessional Education in Athletic Training: The Next Wave (To Tap the Brakes On),* renowned athletic training educator Dr. Paul Geisler questioned the professions seemingly rapid adoption of IPE (Geisler, 2015). Specifically, Dr. Geisler cited the lack of sufficient evidence in the literature regarding the effectiveness of IPE, and the lack of sufficient infrastructure in many athletic training programs to effectively implement IPE learning experiences (Geisler, 2015). While acknowledging the importance of interprofessional collaborative practice, the purpose of the editorial was not to discredit IPE, but rather to encourage stakeholders in athletic training education to thoroughly vet the evidence surrounding IPE before universally requiring its inclusion through accreditation mandate (Geisler, 2015).

In a follow up study to the 2013 white paper, Brietbach et al. (2018) examined the presence of IPE in athletic training curricula. For this study, the authors used a cross-sectional design inclusive of two similar surveys administrated to athletic training program directors in 2012 and 2015 (Breitbach et al., 2018). The surveys examined program participation in IPE, and readiness for future IPE initiatives. Results indicated that significant progress had been made between 2012 and 2015 in the number of programs that included IPE in their curriculum, and the faculty's perceived readiness for meeting future IPE initiatives (Breitbach et al., 2018). Notably, programs that were housed in health-science related academic units, and were accredited at the master's level, reported more institutional support and faculty preparedness for implementing IPE (Breitbach et al., 2018). However, despite a significant increase from 2012 to 2015, still less than half of the programs surveyed participated in IPE at all (Breitbach et al., 2018).

Regardless of the barriers, the athletic training profession has continued to emphasize the implementation of IPE into the curriculum. In the CAATE's updated *2020 Accreditation Standards for Professional Athletic Training Programs*, language directly related to IPE has been included (CAATE, 2019b). Specifically, standard number eight reads, "Planned interprofessional education is incorporated within the professional program" (CAATE, 2019b). The annotation to this standards indicates that while varying methods may be used to meet compliance, each student must have multiple exposures to IPE throughout the curriculum (CAATE, 2019b). This is first instance in which IPE has been specifically identified as an educational requirement, rather than an implied, best-practice suggestion.

Perceptions of IPE in Athletic Training

Previous investigations regarding interprofessional collaboration in the athletic training field have focused in two primary areas; the perceptions of IPCP among practicing athletic

trainers, and the preparedness of faculty to implement IPE in athletic training curricula. In a two part study, Hankemeier and Manspeaker (2017, 2018) examined the perceptions of interprofessional and collaborative practice among practicing athletic trainers. The first part of the study examined practicing athletic trainers across all practice settings. The authors surveyed 2,761 athletic trainers using a stratified random sample obtained through the NATA (Hankemeier & Manspeaker, 2017). Results found that proximity to other health care providers, namely physicians, significantly influenced athletic trainer's perceptions of interprofessional and collaborative practice (Hankemeier and Manspeaker, 2017). However, only 47.33% of respondents believed that they themselves practice in an interprofessional manner (Hankemeier & Manspeaker, 2017). Barriers to interprofessional collaborative practice were identified to be lack of time, lack of knowledge of other professions, poor communication, and low emphasis on teamwork (Hankemeier & Manspeaker, 2017). Part two of the study investigated the perceptions of interprofessional and collaborative practice among athletic trainers practicing exclusively in the collegiate athletics setting (Hankemeier & Manspeaker, 2018). This setting is particularly useful to study as colleges and universities are the second largest employment setting for athletic trainers, accounting for 19.62% of all athletic trainers (NATA, 2019). Using a similar methodology as part one, a cross sectional sample of 739 athletic trainers practicing in collegiate athletics was obtained from the NATA (Hankemeier & Manspeaker, 2018). Results demonstrated that although collegiate athletic trainers agreed that interprofessional concepts were beneficial to patient care, they were not consistently practicing in this manner (Hankemeier & Manspeaker, 2018). Additionally, collegiate athletic trainers that had more exposure to other health care providers held interprofessional collaboration in higher regard than those who did not (Hankemeier & Manspeaker, 2018). The most frequently cited barrier to effective collaboration

was poor communication (Hankemeier & Manspeaker, 2018). The authors concluded that collegiate athletic trainers should consider alternative models of health care, including the medical model, as means of improving communication and interprofessional collaboration (Hankemeier & Manspeaker, 2018).

In a similar investigation Kraemer et al. (2019) examined the perception of IPCP among athletic trainers across all practice settings. The authors developed an online survey to assess athletic trainer's perceptions about collaborative practice, their experience in interprofessional collaboration, and their strategies for implementing interprofessional collaboration in athletic training. The study used a stratified random sampling method by purchasing an email distribution list from the NATA. In total, 4500 athletic trainers were sent the survey, of which, only 314 responded (Kraemer et al., 2019). The results indicated that athletic trainers believe that interprofessional collaboration is important, and identified physical therapists, orthopedic surgeons, and primary care physicians as the most frequent health care professionals they interact with (Kraemer et al., 2019). Respondents perceived interprofessional collaboration to be beneficial in providing comprehensive patient care, with the most significant barrier being the misunderstanding of each other's roles and responsibilities (Kraemer et al., 2019). Subjects identified improvements in communication, and relationship building as the two most needed areas of improvement in regard to interprofessional collaboration (Kraemer et al., 2019). The authors concluded that athletic trainers are in fact interacting with other health care providers on a regular basis, have positive perception of interprofessional collaborative practice, but need more work to improve communication and build collaborative relationships in the clinical setting (Kraemer et al., 2019). Although these results coincide with previous studies, the low response

rate (7%) must be noted, as a more robust sample size would significantly strengthen these claims.

The findings of Kraemer et al., (2019) coincide with a previous investigation by Welsch et al., (2017) that investigated the use of the modified readiness for interprofessional learning scale (mRIPLS) in the assessment of attitudes and beliefs about interprofessional education and collaborative practice among practicing athletic trainers. In this study, the authors used a cross sectional sample of 173 practicing athletic trainers obtained through the NATA (Welsch et al., 2017). Using Cronbach's alpha the mRIPLS demonstrated high overall internal consistency (α = .872), as well as high internal consistency in two subscales: teamwork and collaboration (α = .917) and patient-centeredness (α = .8762) (Welsch et al., 2017). However, a third subscale, professional identity (α = .632) showed moderate-low internal consistency (Welsch et al., 2017). Further, a ceiling effect was noted on ten of the instruments question, whereas > 50% of respondents chose the highest level (highly agree) possible (Welsch et al., 2017). Also, in 22 of the 23 total questions more than 70% of respondents chose two highest levels (agree or highly agree) possible (Welsch et al., 2017). The authors concluded that practicing athletic trainers consistently valued teamwork and collaboration, but the ceiling effect of the instrument, along with the poor internal consistency in the professional identify subscale, render the instrument unreliable (Welsch et al., 2017).

The aforementioned studies are of particular importance to athletic training educators as they attempt to address the barriers and challenges of implementing IPE into athletic training curricula. What these investigations tell us is that practicing athletic trainers understand the value of interprofessional collaboration, but continue to struggle to work in a collaborative way. This

means that IPE strategies must address not only the importance of interprofessional collaboration, but provide students with tangible interprofessional skills as they enter the field.

Implementation of IPE in Athletic Training Curricula

Breitbach and Richardson's (2015) white paper on interprofessional collaborative practice in athletic training made a strong case for interprofessional collaboration both in clinical practice and education. What the paper did not do was explicitly outline how interprofessional education could be implemented into athletic training curricula. Near the same time as the publication of the white paper, Kraemer and Kahanov (2014) examined how IPE could be incorporated into professional athletic training programs. In examining the literature of peer allied health care professions, the authors found that successful IPE programs shared three commonalities: an experienced faculty committed to IPE, strong administrative support, and strong programmatic infrastructure (Kraemer & Kahanov, 2014). Based on these findings, and in an effort to provide athletic training faculty with guidance on IPE, the authors developed the IPE Development Model (IPEDM). The IPDEM consists of a five-stage approach to implementing IPE into an athletic training curricula. First, a team of faculty with a strong and vested interest in IPE should be assembled. Second, the team should identify a vision and purpose for IPE for their institution. Third, a strong marketing campaign should be employed to convey the significance of IPE to senior administration, peer faculty members, and students. Fourth, a curriculum should be developed that meets the needs of all stakeholders, and is aligned with the vison and purpose outlined in stage two. Last, the curriculum should be implemented and assessed on a regular and on-going basis (Kraemer & Kahanov, 2014). The authors acknowledged that barriers exist to successful implementation of the IPEDM, and that institutions should carefully consider their specific challenges at each stage of the model (Kraemer & Kahanov, 2014).

To date, little scholarship exists regarding the efficacy of the IPEDM, or the degree to which it has been adopted in athletic training curricula. In fact, very few studies have been conducted examining the implementation of IPE into the curricula of athletic training programs at all. In one investigation, the authors examined the institutional factors that affect the level of IPE participation within a nutrition dietetics programs and athletic training programs in the United States (Eliot et al., 2017). For this study, program directors for athletic training and nutrition and dietetics programs were surveyed regarding their institutions level of involvement and commitment to IPE (Eliot et al., 2017). Results suggested that both athletic training and nutrition and dietetics programs have similar levels of IPE participation, but still have room for growth and advancement (Eliot et al., 2017). Institutional factors such as resource commitment, academic unit type, and level of program affected implementation and contribution to the development and success of IPE initiatives (Eliot et al., 2017). Notably, the level of the program (undergraduate or graduate), and the academic unit in which the program resides, contributed greatly to the institution's commitment to IPE (Eliot et al., 2017). Specifically, programs offered at the graduate level, and were housed in academic units with other allied health care programs, reported stronger involvement in IPE than those programs that were not (Eliot et al., 2017). These results support the findings of Kramer and Kahanov (2014) that strong administrative support and programmatic infrastructure are key to successful implementation of IPE.

In looking at IPE from the student's perspective, Jutte et al., (2016) examined how a multicourse interprofessional project impacted students' knowledge and views on other health care professions, as well as their own attitudes toward IPE. The authors administered the Readiness for Interprofessional Learning Scale (RIPLS) prior to, and post, completion of a multi-course IPE project. The RIPLS addresses three core aspects of interprofessional collaboration

including teamwork, professional identity and roles and responsibilities. In total, 81 undergraduate students representing athletic training, nursing and health administration fields completed the study (Jutte et al., 2016). Students reported increased knowledge regarding nursing, health administration, athletic training, and other health care professions in general and how their discipline differed from other health care disciplines (Jutte et al., 2016). However, while students agreed that they should improve communication with other health care disciplines, their perceptions related to IPE did not change (Jutte et al., 2016). The authors concluded that a multicourse IPE project is an effective mechanism for increasing knowledge of other health care professions, but does little to convey the importance of interprofessional collaboration (Jutte et al., 2016).

In a similar study, Sniffen et al. (2019) explored case-based learning within existing courses as an IPE strategy. In this study athletic training and physical therapy students worked as interprofessional teams during a co-curricular therapeutic modalities class. During the lab portion of the course students completed four case-based learning activities regarding the application of therapeutic modalities in various patient cases (Sniffen et al., 2019). Following the resolution of the cases, students completed written reflections on the dynamics of their team. Instructors then evaluated these reflections through the lens of the IPEC core competencies (Sniffen et al., 2019). Results showed that this method provided students ample opportunities to incorporate the IPEC core competencies, suggesting that this strategy may be effective in promoting development of student's collaboration skills (Sniffen et al., 2019). Further, the authors suggested that embedding IPE into existing courses, rather than creating new IPE experiences, could be a viable way to overcome the challenges programs face in implementing IPE into their curriculum,

meeting IPE accreditation standards, and preparing students for interprofessional collaborative practice (Sniffen et al, 2019).

The challenge of implementing IPE into already saturated curricula has emerged as a more significant barrier to implementing IPE than originally anticipated. Investigations like Sniffen et al. (2019) regarding infusing IPE into existing curricula are proving valuable to program administrators. As the demand for IPE increases, educators are seeking creative solutions to effectively provide students with interprofessional collaborative skill without overloading the curriculum. One interesting strategy has been utilizing study abroad experiences as a mechanism to promote interprofessionalism. In a recent study, Manspeaker and Wallace (2019) describe their experience in developing a study abroad experience specifically aimed at promoting interprofessionalism. In this study, faculty from athletic training and speech and hearing programs designed and conducted a 17-day immersive study abroad experience for twelve students from seven health care professional programs including: athletic training, nursing, physical therapy, physician assistant studies, premedical, occupational therapy, and speech language pathology (Manspeaker & Wallace, 2019). The authors hypothesized that this strategy could be advantageous as it meets two important needs. First, students desire unique, global learning experiences but may have trouble studying abroad for full semesters due to the lockstep nature of curriculum within their professional education programs (Manspeaker & Wallace, 2019). Second, having students learn from, with, and about each other in an international setting may enhance their preparation for collaborative practice (Manspeaker & Wallace, 2019). The authors concluded that this type of short-term study abroad opportunities offer an alternative to satisfy student interest in global education while meeting programmatic requirements for IPE (Manspeaker & Wallace, 2019). Further, these types of IPE strategies can

increase inclusion of faculty leaders from different disciplines across the globe to foster interprofessional learning.

The relative dearth of scholarship regarding the implementation of IPE in athletic training programs can be attributed to several factors. For one, IPE is a relatively new concept for the field, and there has not been sufficient time to implement IPE, nor to assess it efficiently in the literature. Further, the barriers and challenges to IPE may be more substantial across athletic training programs than initially thought. Garnering faculty buy-in, administrative support, and implementing curricular changes take considerable time and effort. Institutions without experienced faculty and a strong infrastructure for IPE are at an inherent disadvantage. Additionally, the lack of valid and reliable assessment measures make scholarship difficult. What remains evident is that IPE, while deemed necessary and important, has yet to be universally implemented into athletic training programs.

IPE in Health Care Education

History and Evolution of IPE in Health Care Education

In a 1910 address to the graduates of Rush Medical College in Chicago Illinois, Dr. William Mayo stated:

> The best interest of the patient is the only interest to be considered, and in order that the sick may have the benefit of advancing knowledge, union of forces is necessary. It has become necessary to develop medicine as a cooperative science; the clinician, the specialist, and the laboratory workers uniting for the good of the patient, each assisting in elucidation of the problem at hand, and each dependent upon the other for support (Mayo, 1910).

Dr. Mayo's words championing the importance of collaborative health care are as relevant today as they were then. Unfortunately, the realization of effective IPCP in health care has been slow to come to fruition in the United States. Only recently, in response to a fledgling national health care system, has the value of IPCP been recognized. Issues such as rising health care cost, provider burnout, and poor patient outcomes, have forced stakeholders to reexamine the delivery of health care. Today, health care is experiencing a renewed emphasis on IPCP from lawmakers, third-party providers, health providers, and health educators toward the end of a creating more efficient and effective health care system (Perrin, 2015).

Although countries such as the United Kingdom, Canada and Australia embraced collaborative practice and education in health care throughout the early and mid-20th century, it was not until 1972 that the United States began to acknowledge its importance (Breitbach & Richardson, 2015). In their report, *Educating for the Health Team*, the Institute of Medicine (IOM), a branch of the National Academy of Sciences, first identified the importance of collaboration among healthcare providers for the betterment of the patient (IOM, 1972). The report aimed to address six questions pertaining to education of health care providers: (a) Why educate teams? (b) Who should be educated? (c) How should students be educated (classroom emphasis)? (d) How should professionals be educated (clinical emphasis)? (d) What are the requirements for educating health care delivery teams? and (e) What are the obstacles? (IOM, 1972). *Educating* recommended that these questions be addressed at three levels. First, on an institutional level, administrators of health care education programs needed to recognize their obligation to engage in interdisciplinary education and provide such programs with financial and logistical support (IOM, 1972). Second, on a pedagogical level, health care educators needed to develop effective teaching methods, including both didactic and clinical education, to reinforce

interdisciplinary education. Third, on a policy level, government agencies and professional membership associations in health care needed to provide guidance to administrators and faculty in the development of interdisciplinary education for health care delivery teams (IOM, 1972). The objective of *Educating* was to begin the conversation about interdisciplinary education on a national level among major health care professions. The hope was that health care educators and clinicians could work together to begin developing strategies for the way health care teams might be taught (IOM, 1972).

Unfortunately, the recommendations of *Educating* were largely ignored in the decades that followed. Governmental policy of the time did not prioritize health care (Fein, 1980), and without such impetus, professional membership associations in health care did little to advocate for health care education reform. Accordingly, administrators had no motivation to provide institutional support for health care education. Educators were thus left without direction, guidance, or resources to develop interdisciplinary education. Without a solid infrastructure, the recommendations of *Educating* were followed sporadically and inconsistently. Collaborative learning only appeared in response to unique needs of programs, and specific educational situations (Breitbach & Richardson, 2015). The most visible form of collaborative learning was the development of interdisciplinary courses (Eliot et al., 2018). These courses were often designed around specific topics, e.g. diabetes, with students from two or more disciplines enrolling in the same course (Eliot et al., 2018). Although these courses were effective in providing collaborative educational opportunities, they placed little to no emphasis on teamwork, and interprofessional communication skills (Eliot et al., 2018). Further, early iterations of interdisciplinary courses were often comprised of students representing only a small number of health professions. Medical students, nursing students, and pharmacy students constituted the

majority in these courses, with only marginal involvement from students in other health care fields (Eliot et al., 2018). These fields sought value in these courses as they were thought to interact with one another the most, and required the deepest level collaboration. Ironically, this effort to be *more* inclusive often had the opposite effect by segregating and marginalizing other important health care providers in the process.

By the late 20th century the health care system in the United States was becoming increasingly insufficient. Poor patient outcomes, rising health care costs, and gross socioeconomic disparities in access to health care services plagued the system (Fiscella et al., 2000). These issues, and others like them, placed health care reform at the forefront of politics in the United States (Kraemer & Kahanov, 2014). As social and governmental pressure mounted, health care agencies once again turned to improving interprofessional collaborative practice as strategy in maximizing patient outcomes, improving health care efficiency, and reducing healthcare costs (Kraemer & Kahanov, 2014). In 1996, the IOM launched a three-phase initiative geared toward advancing and disseminating scientific information to improve human health (Knebel & Greiner, 2003). In phase one, the IOM sought to document the nature of health care delivery. They concluded that the quality of health care in the United States was poor, and the burden of harm conveyed by the collective impact of poor-quality health care was overwhelmingly harmful to the population (Knebel & Greiner, 2003). Phase two laid out a vision for how the health care system must be radically transformed in order to close the chasm that exists between what we understand good quality care to be, and what actually exists in practice (Knebel & Greiner, 2003). The product of this phase was two reports, *To Err Is Human: Building a Safer Health System (1999)* and *Crossing the Quality Chasm: A New Health System for the 21st Century (2001)*. Phase three focused on implementing the vision laid out in

Crossing. A central component of phase three called for an interdisciplinary summit be held to further reform health professions education in order to enhance quality and patient safety (IOM, 2001). In June 2002, 150 IOM stakeholders, from a variety of health care disciplines, convened to develop ideas about how to integrate a core set of interprofessional competencies into health professions education (Knebel & Greiner 2003). The result of the summit was the book *Health Professions Education: A Bridge to Quality*. The book makes the case that reform of health professions education is critical to enhancing the quality of health care in the United States. Notably, *A Bridge* identified five core competencies that all health care providers should possess, regardless of their discipline, to meet the needs of the 21st-century health system (Knebel & Greiner, 2003). In this context, competencies were defined as the habitual and judicious use of communication, knowledge, technical skills, clinical reasoning, emotions, values, and reflection in daily practice (Hundert et al., 1996). The competencies included patient-centered care, interdisciplinary teams, evidence-based practice, quality improvement, and informatics (Knebel & Greiner, 2003).

As a function of these reports, the IOM emerged as a critical organization in the development and evolution of IPE. Formed in 1970 by the National Academy of Sciences to examine public health policy, the IOM became a strong and reputable voice in advising the federal government on medical care, research, and education issues (NAM, 2019). As a non-profit, non-governmental organization, the IOM (now known as the National Academy of Medicine) is highly respected within the medical community as an authority on health care issues (NAM, 2019). Based on this reputation, IOM reports such as *A Bridge* resonated strongly in the health care community. Notably, *A Bridge* was written by a 19-member interdisciplinary panel called the Committee on the Quality of Health Care in America (NAM, 2019). The committee

was comprised of renowned experts in the fields of medicine, nursing, pharmacy, dentistry, public health, rehabilitation sciences, and health care administration (NAM, 2019). The diversity of the committee, along with minimal governmental influence, gave credence to the intentionality of these reports to be truly impartial, and free from political bias. What was also meaningful about the committee was the strong teamwork and communication they displayed in creating the reports. Their ability to collaborate throughout such an important process modeled what interprofessional collaboration should look like. Where the 1972 report *Educating* had failed, *A Bridge* succeeded by providing health care educators with tangible approaches for health care education reform. Included in these approaches were strategies related to oversight processes, the training environment, research, public reporting, and leadership (Knebel & Greiner, 2003). In this regard, *A Bridge* became the first authentic attempt to make the vision of a better health care system a practical reality by providing health care educators and administrators, an infrastructure to guide health care education reform (Knebel & Greiner, 2003).

A Bridge provided the health care community with a comprehensive template for quality improvement across many aspects of health care. One of the most important was the call for improvements in interdisciplinary teamwork. In response, the World Health Organization (WHO) published the *Framework for Action on Interprofessional Education & Collaborative Practice,* in 2010. The purpose of the *Framework* was to highlight the current status of interprofessional collaboration around the world, identify the mechanisms that shape successful collaborative teamwork, and outline a series of action items that policy-makers can apply within their local health system (WHO, 2010). Notably, the *Framework* identified IPE as a necessary component in the preparation of a collaborative practice-ready health care workforce (WHO, 2010). However, in contrast to the recommendations in *A Bridge*, *Framework* took on a more

descriptive, rather than prescriptive, approach. Recognizing that the educational needs of each health care discipline are unique, and that institutional factors greatly affect the success of IPE, *Framework* served as more of a guide, rather than a how-to, in the implementation of IPE into health care curricula. To that end, *Framework* identified that successful implementation of IPE depends on several factors including: (a) supportive institutional policies, (b) good communication among participants, (c) enthusiasm for the work being done, (d) a shared vision and understanding of the benefits of introducing a new curriculum, and (e) a champion who is responsible for coordinating education activities and identifying barriers to progress (WHO, 2010).

Similar to how *A Bridge* provided the health care system with a broad template for quality improvement, *Framework* provided health care educators guidance on developing collaborative education. However, as programs attempted to implement the recommendations of *Framework* another problem began to emerge. Health care education had become very compartmentalized, with each profession taking responsibility for the content, design and delivery of their own curriculum. As such, nearly all health care fields created their own specialized accrediting bodies, with standards specific to their field. For example, there are currently four separate agencies responsible for accrediting nursing programs in the US alone (Zorek & Raehl, 2013). Each agency has a different perspective on what should and should not be included in the curriculum. Although nursing represents the extreme in this regard, many other programs face similar struggles. Therefore, the interpretation of the *Framework*, and capacity for implementation across all health care fields, varied dramatically. As professions attempted to work toward a more collaborative education model, the compartmentalized nature

of their curricula, and specialized accreditation, created unproductive and inefficient learning situations (Rizzo, Breitbach & Richardson, 2015).

In response to the struggle of implementing the *framework's* recommendations uniformly across all health care fields, the professions of medicine, nursing, pharmacy, dentistry, and public health, developed the Interprofessional Education Collaborative (IPEC) in 2011. The IPEC was formed to promote and encourage constituent efforts that would advance substantive interprofessional learning experiences to help prepare future health professionals for enhanced team-based care of patients and improved population health outcomes (IEC, 2019). The main outcome of the IPEC was the development of core competencies for interprofessional collaborative practice that transcend all health care professions in the United States. To meet the intent of the IPEC initiative, competencies were operationally defined as, measurable knowledge, skills, abilities and behaviors deemed critical to successful performance (Fernandez et al., 2012). The IPEC's four competencies include (a) values and ethics, (b) roles and responsibilities, (c) interprofessional communication, and (d) teams and teamwork. Each competency further contains eight to eleven sub-competencies, specifying each competencies intended outcome (IEC, 2016). The IPEC core competencies have been widely accepted as the foundational competencies for IPE across health care education. Whereas the *Framework* functioned as a descriptive document giving health care educators guidance on developing collaborative education, the IPEC core competencies provided the details programs needed to uniformly implement IPE into their curricula.

Barriers and Challenges of IPE

The 1972 IOM report *Educating for the Health Team* determined that for collaborative education to work, buy-in from governmental agencies and professional membership

associations, institutional administration, and faculty was necessary (IOM, 1972). The sporadic and inconsistent implementation of IPE that followed can be largely attributed to the failure of those parties to prioritize IPE. Nearly forty years later, the WHO's *Framework,* once again identified that buy-in from a variety of stakeholders is necessary for the successful implementation IPE (WHO, 2010). What remains clear is that the implementation of IPE is challenging, consists of many barriers, and requires consistent support from a multitude of stakeholders.

Several barriers have emerged in the literature regarding the implementation of IPE. One significant barrier has been the lack of scholarship regarding IPE strategies. A systematic review of the health care literature found large gaps regarding methods, theory and context associated with IPE (Olson & Bialocerkowski, 2014). The authors note that most of the literature on IPE is related to student's attitudes toward IPE, and their understanding of other allied health care professions (Olson & Bialocerkowski, 2014). The majority of IPE strategies include simulated patient scenarios, combined lectures, and small group discussions (Olson & Bialocerkowski, 2014). Across health care education programs significant differences were found in where IPE was placed in the curriculum, and the level of student participation in IPE events (Olson & Bialocerkowski, 2014). The search also revealed varying levels of perceived importance of IPE among program administrators, and inconsistencies in institutional support (Olson & Bialocerkowski, 2014). Interestingly, the authors stated that IPE in health care is caught in an epistemological struggle between the principles of biomedical science, and education (Olson & Bialocerkowski, 2014). On one hand, biomedical sciences attempt to objectify the experience and assign numerical value to learning progression, whereas education tends to focus more on the perceptions and experience of the individual student (Olson & Bialocerkowski, 2014). The

authors recommended that future research consider taking a more inductive approach to examine the context of IPE as opposed to only using the deductive approach of assessing outcomes (Olson & Bialocerkowski, 2014).

Other barriers to IPE including curriculum saturation, physical logistics, institutional support, faculty buy-in, and program proximity have also been reported. In examining the implementation of IPE at a large Midwestern university, Breitbach et al. (2013), found that adding IPE content to the already saturated curricula of health care education programs to be a particularly difficult challenge. Institutional restraints surrounding student credit hours, faculty teaching load, and the addition of IPE into multiple curricula significantly hindered the development of IPE initiatives (Breitbach et al., 2013). Physical logistics such as coordinating student schedules, and finding conducive space for a large number of students likewise proved challenging (Breitbach et al., 2013).

One of the most prevalent barriers expressed in the literature is institutional support. In looking at the implementation of IPE in athletic training and nutrition and dietetics programs, it was found that programs with strong administrative support at the department, school and university level, significantly increased the quality of IPE experiences (Eliot et al., 2018). Specifically, institutional buy-in through financial and logistical support helped ease the burden of curricular saturation and physical logistics (Eliot et al., 2018). The authors concluded that institutional and administrative support was the single biggest factor in the successful development of IPE initiatives (Eliot et al., 2018).

An underreported, but nonetheless significant, barrier to IPE implementation is the buy-in of faculty (Breitbach et al., 2018). Often, the responsibility of creating and developing IPE content falls to the faculty. This responsibility adds to the already heavy research, teaching and

service loads of many faculty in health care education programs (Eliot et al., 2018). Further, it is not safe to assume that all faculty support IPE (Breitbach et al., 2018). There is still a lack of understanding among faculty about IPE and the roles and responsibilities of other professions (Eliot et al., 2018). Additionally, the physical proximity of programs to each other also appears to play a role in the success of IPE initiatives (Breitbach et al., 2015, Breitbach et al, 2018, Eliot et al., 2018). Programs that are housed in the same academic unit, and on the same campus, have an easier time developing IPE experiences than those who attempted to collaborate with programs in different units or on other campuses (Eliot et al., 2018).

Of the aforementioned barriers, faculty buy-in and program proximity appear to be especially significant in many health care disciplines. For many faculty, IPE is just the latest among many new educational concepts in health care. Some feel as though IPE is simply the latest "buzz-word" and it is wise to proceed with caution (Geisler, 2015). It is not unreasonable for faculty to feel this way as health care education has endured significant reform over the last twenty years. Since 2000, many fields have embraced new accrediting agencies, curriculum overhaul, and professional degree elevations (Breitbach et al., 2018). It is therefore understandable that when, yet another new concept comes along, faculty become resistant.

In a similar way, the lack of physical proximity to peer programs within their respective institutions has significantly hindered IPE initiatives for many programs. At its fundamental core, IPE is about interacting with peer health care professionals. If peer professions are not housed within the same academic department, school, or even exist in the institution at all, it makes collaboration very difficult. Realignment of academic programs within an institution is often a monumental endeavor that can takes years to complete. Getting faculty, and students, in

closer proximity to their appropriate peers is likely to remain a significant barrier in the foreseeable future.

One of the most significant challenges to implementing IPE is the compartmentalized nature of health care education. Nearly every health care discipline self-regulates their curriculum through specialized accreditation. When the IPEC core competencies were released in 2011, programs struggled to retroactively align the IPEC competencies with their own accreditation standards. In response, the Health Professions Accreditors Collaborative (HPAC) was established to formalize interactions across accreditors and to serve as a platform for proactive problem solving and sharing of information on implementing IPE (HPAC, 2019). The HPAC consists of 25 members each representing a health care profession's accrediting body. HPAC members identified the need to ensure that their individual actions facilitated, and were not barriers to, the development of quality IPE at constituent institutions. To this end, HPAC embarked on a multi-year, multi-phase, process to create a consensus document to support the development and implementation of quality IPE (HPAC, 2019). While maintaining individual accreditor's autonomy, the document seeks to encourage increased communication and collaboration and to provide guidance on expectations related to quality IPE (HPAC, 2019). The document offers consensus terminology and definitions for interprofessional education (IPE) and related concepts to guide plans for developing, implementing and evaluating IPE. It encourages institutional leaders to develop a systematic approach to foster IPE in their own institution and, where appropriate, with collaborating academic institutions, health systems, and community partners. Further, it provides a framework (rationale, goals, deliberate design, and assessment and evaluation) for program leaders and faculty to develop a plan for quality IPE (HPAC, 2019). Finally, it provides opportunities for HPAC member accreditation boards/commissions to utilize

the guidance to assess their IPE standards and to train site visit teams regarding essential elements of quality IPE (HPAC, 2019).

An emerging barrier to IPE is the inequality in health and health care delivery that is pervasive throughout the health care field. Disparities in the care and outcomes of women, children and racial/ethnic minorities have been well documented in the literature (Maina et al., 2018; Kim et al., 2017; Byrne & Tanesini, 2015). Evidence suggests that provider bias, both explicit and implicit, plays a significant role in these disparities (Maina et al., 2018; Byrne & Tanesini, 2015). The bias that participants bring with them by virtue of their own gender and racial/ethnic identity creates a unique barrier to the successful implementation of IPE that must be taken into consideration.

In an effort to synthesize the current knowledge on the role of implicit bias in health care disparities, Maina et al., (2018) conducted a systematic review of the medical literature between May 2015 and September 2016. In total, 37 studies addressing implicit bias were identified. Of these, 31 found evidence of pro-White or light-skin/anti-Black, Hispanic, American Indian or dark-skin bias across a variety of health care providers (Maina et al., 2018). Fourteen of the studies examined implicit bias and health care outcomes using case-based scenarios or patient simulations. Eight of these found no statistically significant association between implicit bias and patient care, while six found that implicit bias contributed to disparities in treatment recommendations, expectations of therapeutic bonds, pain management and empathy (Maina et al., 2018). Conversely, all seven of the studies that examined implicit bias on real patients found that providers with stronger implicit bias demonstrated poorer communication with patients, and poorer patient outcomes (Maina et al., 2018). The authors concluded that implicit bias in health

care is a complex problem and strategies aimed at reducing implicit bias, such as improved interprofessional education, is needed to mitigate the problem (Maina et al., 2018).

In a similar study, Kim et al. (2017) conducted a scoping review of the health care literature that reported on sources and consequences of conflict associated with individual, and interpersonal factors. In total, 99 articles published between 2001 and 2015 were identified as addressing conflict between health care providers (Kim et al., 2017). In regard to individual conflict, implicit bias that exists within self-focus, self-esteem, or worldview, as well as individuals' conflict management styles contributed significantly to negative patient outcomes (Kim et al., 2017). Similarly, implicit biases were found to negatively contribute to interpersonal dynamics among small groups of health care providers, including such uncivil behaviors as bullying and humiliation (Kim et al., 2017). These types of disrespectful working environments were further believed to weaken team collaboration, disrupt communication with patients, and result in poorer patient outcomes (Kim et al., 2017). The authors stressed the importance of continuing scholarship on implicit bias in healthcare, and supporting the efforts to improve IPCP among health care providers. Notably, the authors recommended that enhancing IPE across health care education is likely to be the most effective way to address bias in health care (Kim et al., 2017).

Much like other areas of health care, the athletic training profession is not immune to the detrimental effects of implicit and explicit bias. Most concerning is the persistent lack of racial and ethnic diversity within the profession. According to the November 2020 *Ethnicity Demographic Data* published by the National Athletic Trainer's Association, 80.81% of all practicing athletic trainers identify as Caucasian (NATA, 2020). Further, only 4.03% identify as African American, .01% as Alaskan Native, .5% as American Indian, 4.18% as Asian or Pacific

Islander, 5.46% as Hispanic, 2.13% as multi-Ethnic and 2.36% as other (NATA, 2020). This distribution unfortunately remains consistent among professional athletic training students. According to the most recent CAATE analytics data, 78% of students enrolled in professional athletic training programs identify as White, while only 8% identify as Black or African America, 8% as Hispanic or Latino and 2% as two or more races (CAATEc, 2018). A key element in addressing implicit and explicit bias is developing a better understanding others positionality and perspectives. With the overwhelming majority of the athletic training profession identifying as white, the potential for harboring implicit bias, and developing explicit bias remains strong.

Addressing health care provider bias is an essential component in improving IPCP. Accordingly, the positionality of participants based on gender and racial/ethnic identity as they engage in IPE experiences must be taken into consideration. Developing effective communication skills, using conflict resolution strategies, understanding the roles and responsibilities of others, and instilling a sense of values and ethics is the quintessential essence of IPE. These factors are likewise critical in addressing and overcoming bias. As such, failure to take into account participant's positionality in IPE experiences remains a significant barrier in the development of IPE strategies.

IPE Strategies

The development of the IPEC core competencies brought IPE to the forefront of health care education. The competencies provided programs with tangible criteria for the development of pedagogical strategies for IPE. Henceforth, strategies for IPE took one of two forms: IPE specific courses or single, large-scale events. In single, large-scale events, students engage with a large number of peers, from a wide variety of disciplines, and are required to work together in

handling a mock patient scenario. In an examination of student's expectations and experiences during these type of events Rosenfeld, Oandasan and Reeves (2011) found that students demonstrated an understanding of the value of IPE, and found that interacting with health care students from other fields increased their understating of each other's roles and responsibilities. However, students also reported that single, large-scale events felt disorganized, which affected their ability to work as a team (Rosenfeld, Oandasan & Reeves, 2011). This study used an exploratory case study methodology, wherein eight focus groups comprised of students from medicine, pharmacy, dentistry, occupational therapy and social work were interviewed over a two-year period. Interestingly, this study is one of the few in the IPE literature that uses a qualitative approach in assessing student's perceptions of IPE. The authors concluded their methodology may be useful in future research as it provides a more organic assessment of how students feel about their IPE experiences in a way that quantitative methods cannot capture (Rosenfeld, Oandasan & Reeves, 2011).

The second, and most common, type of intervention strategy is the development of an IPE specific course. In this model, students from a variety of health care education programs at the same institution take a co-curricular course that directly addresses interprofessional collaboration. In examination of such a course, Reubling et al. (2014) assessed the attitudes and perceptions of students before and after an introductory IPE course. Using the University of West England Interprofessional Questionnaire (UWE IQ) they found that students who completed the course were more engaged in interprofessional collaboration, and held a more positive view toward IPE than their peers who did not take the course (Reubling et al., 2014). In a similar study, Rahman et al., (2014) also used the UWE QI to assess attitudes and perceptions of IPE in nutrition and dietetics students enrolled in an IPE course. Like Ruebling et al. (2014),

they found that students exhibited a greater understanding of other health care fields, and greater confidence in building relationships with other allied health care professionals after having taken the course (Rahman et al. 2014). Bultas et al. (2018) identified similar results in their qualitative document analysis of students written reflections about their experiences in an introductory IPE course. Their results show that an introductory IPE course can improve students understanding of the health care system in the United States, and thus improve their ability to communicate and collaborate with one another (Bultas et al. 2018).

Eliot et al. (2018) also supported the inclusion of an IPE course in health care education curricula in their study examining the effectiveness of an introductory IPE course in improving students' collaboration skills. Using the Self-Assessed Collaboration Skills (SACS) measure, they found that an IPE course significantly increased student's self-assessed collaboration skills (Eliot et al., 2018). The SACS, developed by Hinyard et al. (2018) has been demonstrated to have high internal consistency, and internal validity in measuring self –assessed collaboration skills. Specifically, courses that cultivate interactive class discussion with faculty, require a culminating team project, and use in-class time for team meetings were most effective (Eliot, et al., 2018). The study also suggested that the earlier in the degree program that students take such a course, the more receptive and adaptive they become to collaboration (Eliot et al., 2018). Although the results of the study were promising, there remained two key factors that were not accounted for. First, the structure of the interdisciplinary course only addressed two of the IPEC core competencies, teams and teamwork, and roles and responsibilities. The projects associated with the course did not address the other two competencies: values and ethics and interprofessional communication. Second, the authors based their conclusions on the students self-assessed collaboration skills immediately after the course. It stands to reason that having

just finished the course, student would perceive their skills to be better than when they started. For how long the students retained these skills remains unclear.

The TEACH! Curriculum

The Team Education Advancing Collaboration in Healthcare (TEACH!) curriculum is a longitudinal curriculum that students in health care professions within the Indiana University system complete over the course of their professional degree programs (IU IPEC, 2020). The curriculum includes eight university partners and learners from 17 health professions (IU IPEC, 2020). The goal of the TEACH! curriculum is to enable students to learn and practice critically important core interprofessional practice competencies, enabling them to work effectively as part of a person and community-centered team to improve health and well-being by enhancing the experience of healthcare, improving population health, and reducing the overall cost of healthcare (IU IPEC, 2020). The TEACH! curriculum is unique due to its scope, scalability, institutional commitment, community partnerships, and alignment with health care organizations (IU IPEC, 2020).

Rather than a single, large-scale event, or an isolated IPE course, the TEACH! curriculum consists of a series of six large-scale events referred to as anchors. The anchors are classified into three levels of experience: exposure, immersion and entry to practice. In keeping with the recommendations set forth by the WHO's *Framework,* staff members at the Indiana University Interprofessional Education and Practice Center (IU IPEC) recruit faculty who champion IPE in their fields. These faculty, along with IU IPEC staff, constitute a working group that continually develop each level of experience and subsequent anchors. The anchors are designed to uniformly incorporate specific aspects of each of the four IPEC core competencies, and sub-competencies (IU IPEC, 2020). In order to eliminate the burden of finding time and space in an

already saturated curriculum, each health care program incorporates the TEACH! curriculum as a requirement in existing courses within their program. Students are advanced through the curriculum in a sequential manner, progressively building on interprofessional collaborative knowledge and skill. Each anchor of the TEACH! curriculum includes: individual preparation/pre-work, learning objectives linked to specified interprofessional collaborative practice competencies, attention to the impact the community context of care can have on health and health care, case-based situated learning, team building, formative assessment and/or competency-based evaluation and reflection and debriefing (IU IPEC, 2020).

Orientation

Prior to participating in the TEACH! curriculum, learners are required to complete an IPE orientation with faculty from their own program. The primary goal of orientation is to engage and prepare students for learning about, from, and with each other through interprofessional education and collaborative practice that improves health outcomes (IU IPEC, 2020). The orientation is intended to introduce IPE and IPCP to students, and allow faculty to frame interprofessional collaboration from the perspective of their own field (IU IPEC, 2020). Further, orientation gives students a foundation for understanding their own professions role in health care, in order to effectively communicate their knowledge and skills to others.

Exposure Level - Anchors One and Two

The primary goal of the exposure level is to expose learners to the fundamental components of interprofessional collaborative practice, as well as the benefits and outcomes of working in teams to improve health and healthcare outcomes (IU IPEC, 2020). In anchor one, learners work in teams to learn about, and begin to understand, the roles and responsibilities of each health profession and to consider the basic tenets of effective team formation. Through

team building and situated case study, team members share perspectives, prioritize health concerns, and co-create a collective approach to care, all while balancing the potentially competing values and priorities across the team (IU IPEC, 2020). In anchor two, communication tools are introduced and used to support effective, collaborative interprofessional teamwork. Role playing and simulated case studies related to one or more health challenges in acute/chronic care, ambulatory care, and community settings allow learners to practice newly acquired information and skills with feedback from each other and trained facilitators. This provides students with an opportunity to address conflict, and improve communication skills in authentic situations (IU IPEC, 2020). The exposure level infuses and addresses all four of the IPEC core competencies (Table A1)

Immersion Level - Anchors Three and Four.

During the immersion level learners are immersed in interprofessional teams to discover personal, professional, and cultural similarities and differences and then experience how these shape assumptions and biases that can interfere with the team's abilities to work together (IU IPEC, 2020). In anchor three, learners work in interprofessional teams in simulations with standardized actors to apply principles of person-centered care to create a comprehensive health plan for someone living in the community with complicated and competing health issues (IU IPEC, 2020). In anchor four, learners are placed in a simulated environment where they work as a team with a patient/client to understand and resolve barriers to communication and effective interprofessional care. Team member's self and team-assess and provide feedback to one another about the quality of interprofessional teamwork that occurs using standardized metrics as the jumping off point for a team huddle and debriefing (IU IPEC, 2020). The immersion level infuses and addresses all four of the IPEC core competencies (Table A2).

Entry-to-Practice Level - Anchors Five and Six

The entry-to-practice level facilities learners' participation in team-based care during their work in the professional environment (clinical or practical), and then to observe and reflect on the extent of interprofessional collaborative practice (IU IPEC, 2020). In anchor five, the setting and requirements are program specific. Individual programs determine the logistics of anchor five as it pertains to their respective field. However, learning objectives, reflection framework, formative assessment, and final evaluation of interprofessional collaborative practice competencies is standardized across programs (IU IPEC, 2020). Anchor six serves as a continuum of anchor five. Successful completion of anchor six requires that learners demonstrate interprofessional collaboration in practice and entry-level readiness to be engaged members of effective healthcare teams (IU IPEC, 2020). The entry-to-practice level infuses and addresses all four of the IPEC core competencies (Table A3). At present, the IU IPEC only administers anchors one through four to participating programs. Development, implementation, and assessment of anchors five and six are at the discretion of the individual programs. Neither the professional athletic training program at Indiana University – Bloomington nor the profession at large has developed anchors five and six. Therefore, professional athletic training students only participate in anchors one through four.

Learning Environment

An inherent strength of the TEACH! curriculum is its ability to bring students from different backgrounds together, in the same physical space, on multiple occasions, to learn not only with each other, but about each other. By virtue of design, the TEACH! curriculum intentionally places students in situations where they must interact with one another to fully understand the roles and responsibilities of each member of the team. Ideally, this is best

accomplished in a face to face environment where communication can occur openly and freely. Hence, in its traditional form, the TEACH! curriculum is offered entirely in a face to face learning environment. However, the global pandemic caused by the novel coronavirus (COVID-19) in academic year 2019-2020 significantly hindered opportunities for face to face interactions across all facets of society. In response, the IU IPEC adapted anchors three and four to be delivered virtually through the learning management system Canvas. While the content of each anchor remained unchanged, the way in which students interacted with one another changed significantly. Participants were still required to complete all individual readings and assignments prior to, and following, each anchor just as they would have been expected to do in the face to face environment. The prompts and tasks associated with team meetings were also the same as if the group had met face to face including group assignments and team reflections. The notable change was how participants were expected to interact with one another. Rather than meeting with their team in person at a predetermined location on an assigned day and time, participants were required to meet virtually to work through the prompts of the anchor. As the pandemic expedites the need for virtual health care, the ability of the TEACH! curriculum to adapt to different learning environments is of critical importance. Current students and future health care providers will need to be able to collaborate with one another in an on-line environment. Translating interprofessional collaborative competency to this environment is essential to the future of interprofessional education.

Conclusion

Effective interprofessional collaborative practice between health care providers is an essential component in improving the health care system in the United States. Although the importance of collaborative care has been recognized for over a century, only recently has the health care community taken active steps toward developing collaborative skill. Today,

interprofessional collaborative practice and education is key element of many health care education programs.

Athletic training is a relatively new allied health care field. As the profession strives to remain relevant among a diverse array of health care providers, embracing interprofessional collaborative practice and education is essential to the long-term viability of the profession. Recent changes in accreditation will force athletic training faculty and administrators to implement IPE into their curricula. At present, there is little scholarship related to IPCP in athletic training clinical practice or IPE in athletic training education. Accordingly, determining best practices for IPE strategies is critically important to the future of the athletic training profession.

Various strategies have been developed to implement IPE into health care education, including IPE specific coursework, single, large-scale events and study-abroad experiences. The TEACH! curriculum, developed by the Indiana University Center for Interprofessional Practice and Education, is a unique and innovative method for implementing interprofessional collaborative competency. To date, little scholarship is available on the effectiveness of IPE strategies in interprofessional collaboration competency attainment, and no evidence is available regarding the TEACH! curriculum. Further, little scholarship exists on IPE and IPCP in the athletic training field, and fewer evidence is available regarding the efficacy of IPE strategies in interprofessional competency attainment in athletic training students. Therefore, the purpose of this study was to assess the effectiveness of the TEACH! curriculum in interprofessional collaborative competency attainment among professional athletic training students.

Chapter III: Methodology

The Indiana University Interprofessional Practice and Education Center (IU IPEC) uses the Interprofessional Collaborative Competency Attainment Scale (ICCAS) to assess TEACH! curriculum participant's interprofessional competency attainment (Fig. B1). In order to assess the effectiveness of the TEACH! curriculum for professional athletic training students, I examined ICCAS data from TEACH! curriculum participants who were enrolled in their final year of the professional athletic training program at Indiana University-Bloomington. In the first part of this chapter I will discuss the design of the study, including the rationale for secondary data analysis, and how data was collected. Next, I will discuss the participants of the study and how the TEACH! curriculum is implemented into their professional degree program. I will then discuss the ICCAS including variables, measures, validity, reliability, and merits of the post-program data collection strategy. Lastly, I will address the limitations of the study, and conclude the chapter with how data was analyzed.

Research Design

I conducted a secondary analysis of ICCAS data collected from students who were enrolled in their final year of the professional athletic training program at Indiana University-Bloomington in academic years 2018-2019 and 2019-2020. Secondary data analysis was an appropriate design for this study for several reasons. For one, there is no published literature, to date, regarding the TEACH! curriculum. Although the IU IPEC implements a thorough assessment plan for the TEACH! curriculum, there are no data available regarding its effectiveness in interprofessional collaborative competency attainment among participants. Analysis of existing data was therefore imperative to first, assess the effectiveness of the

curriculum in its current state, and second, to establish a base of knowledge from which to generate future research.

Another reason secondary analysis was appropriate in this context was the lack of evidence regarding a series of large-scale events as an IPE strategy. Existing literature on IPE strategies have primarily focused on two areas, IPE specific courses, and single large-scale events. Literature on a series of large-scale events, such as the TEACH! curriculum, does not exist. The primary benefit of a series of large-scale IPE events, as opposed to a single large-scale event, is more time to fully address the IPEC core competencies throughout a student's professional degree program. A series of large-scale events allows for more in-depth exposure to interprofessional collaboration, and more opportunities to implement interprofessional skills. Spreading IPE throughout the curriculum creates an environment in which participants simultaneously infuse interprofessional collaborative skills with the knowledge and skill of their field. This strategy better emphasizes the importance of interprofessional collaboration as an essential component of their development as a health care provider. Conversely, single large-scale events offer only a brief exposure to interprofessional collaboration, and typically only addresses one area of the IPEC core competencies. The importance of collaborative practice therefore may be perceived by participants as only supplemental to their field; skills that are good practice, but not necessarily essential. In the same way, a series of large-scale events may also be an improvement over IPE specific courses. Although these courses have more contact time with students than single large-scale events, the focus of the course is often on a single topic (e.g. diabetes) rather than on interprofessional collaboration itself. This is evident in the literature as IPE specific courses have been demonstrated to improve participants understanding of the roles and responsibilities of peers but do little to address the other competencies such as

interprofessional communication, values and ethics, and teams and teamwork. Therefore, secondary analysis of existing data on a series of large-scale events can help determine if this strategy more adequately addresses interprofessional competencies than IPE specific courses and single large-scale events.

Provided the limited amount of literature regarding IPE strategies in athletic training education, secondary analysis of strategies already being undertaken was a worthwhile endeavor. Participation in a series of large-scale IPE events like the TEACH! curriculum by professional athletic training students is unprecedented in the field. Therefore, examining existing data for athletic training students who have participated in the TEACH! curriculum was critical in contributing to the knowledge base for IPE in the field. Additionally, the TEACH! curriculum is a unique IPE strategy both in design and implementation. Given that this type of IPE strategy does not exist in the literature, and is inherently unique to the athletic training field, analyzing existing data was an appropriate first step in assessing its effectiveness in interprofessional collaborative competency attainment.

Data Collection

The ICCAS was administered to participants by staff from the IU IPEC immediately following completion of anchor four of the TEACH! curriculum. Although the TEACH! curriculum consists of six anchors, at present, the IU IPEC has only developed anchors one through four for participating programs. Development, implementation, and assessment of anchors five and six are at the discretion of individual programs. Neither the professional athletic training program at Indiana University-Bloomington, nor the athletic training profession at large, have developed anchors five and six. Therefore, administration of the ICCAS to professional athletic training students following anchor four was most appropriate.

In the traditional face to face environment participants received the ICCAS immediately following completion of anchor four. This occurred in one of two ways. Most commonly, participants received an email from the IU IPEC containing a Qualtrics survey link. The IU IPEC converted the ICCAS to a Qualtrics survey format suitable for completion on a cell phone or personal computer. Participants were asked to complete the ICCAS using their own personal electronic device prior to leaving the event. Participants who did not have a personal electronic device, or who did not receive the email, were given a paper copy of the scale to complete. Participants who completed anchors three and four of the TEACH! curriculum in the virtual environment received the same Qualtrics survey link to the ICCAS at the conclusion of anchor four. Regardless of learning environment, all participants were required to complete the ICCAS in order to receive credit in their respective programs for attending the event. Responses were collected and stored by IU IPEC staff and administrators. Because each anchor of the TEACH! curriculum is mapped to courses in each participating program's curriculum, faculty in each respective program are given access to their student's ICCAS data upon request. By virtue of being a faculty member in the professional athletic training program, I was given direct access to ICCAS data for athletic training student participants immediately upon completion of anchor four.

Study Participants

Participants in this study consisted of thirty-one undergraduate students who were enrolled in their final year of the professional athletic training program at Indiana University-Bloomington in academic years 2018-2019 and 2019-2020. These participants represent the entire population of professional athletic training students who have ever participated in the TEACH! curriculum. Across both cohorts, eleven (35%) identified as cis-male, and 20 (65%)

identified as cis- female with a mean age of 22 +/- 1.75 years. Twenty-four (77%) participants identified as White, three (10%) as Black or African American, three (10%) as Hispanic or Latino and one (1%) as two or more races. The demographic profile of participants in this study is a near microcosm of the national population of all students enrolled in professional athletic training programs. According to the most recent CAATE analytics data, 63.2 % of all professional athletic training students identify as cis-female and 37.8% identify as cis-male (CAATEc, 2018). Further, 78% identify as White, 8% as Black or African America, 8% as Hispanic or Latino and 2% as two or more races (CAATEc, 2018). At the time of data collection all participants had completed all required coursework in the professional athletic training program. Participants had also completed the clinical education portion of the curriculum which consisted of seven clinical experiences with a diverse array of patients, across a wide variety of clinical settings including: division one athletics, high school athletics, the performing arts, and the military.

Participation in the TEACH! curriculum was a course requirement within the professional athletic training program at Indiana University-Bloomington. Specifically, anchor's one and two were completed in the fall semester of the final year as a requirement in SPH-A481 Clinical Education in Athletic Training V. Anchor's three and four were completed in the spring semester of the final year as a requirement in SPH A482 Clinical Education in Athletic Training VI. Participation in anchors five and six were not required as these anchors have not been fully developed for the athletic training profession. Completion of each anchor was graded on a pass/fail basis. Failure to complete an anchor would result in a grade of incomplete for the course. Students were therefore required to complete all four anchors in order to pass each respective course, and graduate from the program. The 2018-2019 cohort (n=16) completed the

TEACH! curriculum in the traditional format with all four anchors delivered in a face to face environment. Due to the COVID-19 global pandemic, the 2019-2020 cohort (n=15) completed the TEACH! curriculum in two learning environments. Anchors one and two were completed in the face to face environment, while anchors three and four were completed in the virtual environment through the learning management system Canvas.

Variables and Measures

The ICCAS was designed to be a post-program data collection strategy in which post-test and retrospective pre-test data are collected to assess the change in interprofessional collaboration-related competencies in healthcare students and practicing clinicians before and after IPE training interventions (MacDonald et al., 2010). In its current form, the ICCAS contains 20 items evaluated on a five-point, unbalanced, qualitative Likert scale: 1 = *poor*; 2 = *fair*; 3 = *good*; 4 = *very good*; 5 = *excellent*, and one post-assessment question capturing students overall change in abilities. The first 20 items of the scale contain an action statement related to interprofessional collaboration. For example, item one states, *"Promote effective communication among members of an interprofessional (IP) team."* The retrospective pre-post approach allows participants to complete the scale after IPE training, but rate their abilities twice: once as they recall them prior to training, and again after training is done (Archibald, Trumpower & MacDonald, 2014). Therefore, for each item, participants are asked to rate their ability to perform that skill, or action. In the pre-assessment participants are asked *"Before participating in the learning activities, I was able to…,"* and in the post-assessment they are asked *"After participating in the learning activities, I was able to…"* The wording of each item along with the pre and post-assessment prompts direct participants to focus their evaluation directly on the learning intervention.

The ICCAS was originally developed at the University of Ottawa as part of a nationally funded initiative in IPE (MacDonald et al., 2010). Scale items were written by a small group of IPE educators in accordance with the six domains of interprofessional practice as establish by the Canadian Interprofessional Health Collaborative (CHIC): communication, collaboration, roles and responsibilities, collaborative patient-family-centered approach, conflict management/resolution, and team functioning (MacDonald et al., 2010). The content of each item was originally created and validated through a nominal group technique with a broad group of subject matter experts from a variety of disciplines (MacDonald et al., 2010). Two subsequent validation studies (Archibald et al., 2014, Schmitz et al., 2017) both found that the factor structure of each construct were not mutually exclusive, but exhibited signs of single factor loading. This suggests strong conceptual overlap among items indicating strong content validity for the scale. In the most recent replication validation study of the ICCAS, Schmitz et al. (2017) implemented a 21st question: *"Compared to the time before learning activities, would you say your ability to collaborate interprofessionally is. . ."*: 1 = *much better now*; 2 = *somewhat better now;* 3 = *about the same*; 4 = *somewhat worse now*; and 5 = *much worse now* (Archibald, Trumpower & MacDonald, 2014, Schmitz et al., 2017). The purpose of adding this question was to capture students' assessment of how much their overall interprofessional skills and abilities had changed during the IPE learning activity. It is intended to be an overarching question, and is therefore answered only one time in the post-assessment

Retrospective Pre-Post Design

The retrospective pre-post design has been shown to be a simple, convenient, and expeditious method for assessing program effectiveness in responsive interventions (Klatt & Taylor-Powell, 2005). In a synthesis of the literature regarding retrospective pre-post designs,

Klatt and Taylor-Powell (2005) examined 49 articles representing sources from educational measurement, psychology, sociology, health, agricultural education, evaluation, extension, management, training, and social work. The authors postulated that response shift bias seen in traditional pre-test, post-test designs poses a threat to the validity of measurements, which can result in underestimating or overestimating program effects (Klatt & Taylor-Powell, 2005). Additionally, traditional pre-test self-reports can be influenced by the individual's perception of what the intervention will cover. Results of the analysis found that retrospective pre-post designs appear to reduce response shift and preprogram assumptions, but may intensify other biases such as social desirability, effort justification or hindsight (Klatt & Taylor-Powell, 2005). The authors concluded that although these additional biases need to be further investigated, the retrospective pre-post design provided a convenient, valid method for measuring self-reported change (Klatt & Taylor Powell, 2005).

In an earlier study, longitudinal data from 307 mothers with firstborn infants participating in a home-visitation, child-abuse prevention program was analyzed using a retrospective pre-post design (Pratt et al., 2000). A self-report measure of specific constructs the program hoped to affect showed that the retrospective pre-post methodology produced a more legitimate assessment of program outcomes than did the traditional pre-test-post-test methodology (Pratt et al., 2000). Results found that when response shift bias was present, traditional pre-test-post-test comparisons resulted in an underestimation of program effects that could easily be avoided by the retrospective pre-post methodology (Pratt et al., 2000).

In a more recent study, investigators examined competency attainment in pediatric resuscitation among medical students following participation in a 4-hour course (Bhanji et al., 2012). For this study, students completed both pre and post self-assessments and retrospectively

rated their understanding as it was pre-course (Bhanji et al., 2012). Changes in traditional and retrospective pre to post-course self-assessment measures were compared to an objectives-based multiple-choice exam (Bhanji et al, 2012). Results indicated that students were able to accurately identify, but not quantify, learning using either traditional or retrospective pre–post self-assessment measures (Bhanji et al., 2012). However, retrospective pre–post self-assessment was more accurate in excluding perceived change in understanding of subject matter that was not taught (Bhanji et al., 2012). Authors concluded that the retrospective pre-post design allows subjective assessment of learning without sensitizing the learner to the subject matter with a prequestionnaire (Bhanji et al., 2012). They postulated that this method may be particularly useful in medical and health care education as it requires few resources, little development time, and is easy to implement (Bhanji et al., 2012).

Validity and Reliability of the ICCAS

The ICCAS has been demonstrated to be a valid and reliable measure in assessing interprofessional collaborative competency attainment (Archibald, Trumpower & MacDonald, 2014; Schwindt et al., 2017; Schmitz et al., 2019). Archibald, Trumpower and MacDonald (2014) found that scores on the ICCAS are reliable and predict meaningful outcomes with regard to attitudes toward interprofessional competency attainment. In their study, the ICCAS was assessed by exploratory factor analysis (EFA) using principal axis factoring (PAF). PAF was conducted separately on the twenty pre-program items and then again on the twenty post-program items to evaluate the structure of the ICCAS at both times (Archibald, Trumpower & MacDonald, 2014). PAF revealed the presence of two factors in the pre-program, and one factor in the post program. Cronbach's alpha coefficients in the pre-program were calculated for items loading on factor 1 (perceived ability to provide interprofessional care) at 0.961, and factor 2

(perceived ability to work as part of an interprofessional team) at 0.941 (Archibald, Trumpower & MacDonald, 2014). For the post-program assessment, Cronbach's alpha was 0.981 for all items (Archibald, Trumpower & MacDonald, 2014). The authors concluded that this structure suggests the intervention influenced learners' understanding of interprofessional care by promoting the recognition of the high degree of interrelation among interprofessional core competencies (Archibald, Trumpower & MacDonald, 2014).

In a similar study, Schwindt et al. (2017) used the ICCAS to assess student's IPE competency attainment following a single, large-scale IPE event. In this investigation, students in social work, pharmacy and nurse practitioner programs completed an interprofessional training event designed to encourage a collaborative approach to tobacco dependence treatment for individuals with mental illness (Schwindt et al., 2017). Similar to Archibald, Trumpower and MacDonald (2014), the authors assessed the ICCAS using an EFA with a PAF, and Cronbach's alpha for internal consistency (Schwindt et al., 2017). Just as Archibald, Trumpower and MacDonald, (2014) found, Schwindt et al. (2017) also determined the presence of two factors in the pre-program, and one factor in the post-program. Cronbach's alpha coefficients in the pre-program were 0.97 for factor 1 (perceived ability to provide interprofessional care), and .96 for factor 2 (perceived ability to work as part of an interprofessional team) (Schwindt et al., 2017). In the post-program, Cronbach's alpha was 0.963 for all items (Schwindt et al., 2017). The authors concluded that the ICCAS is an appropriate instrument for assessing students' perceptions related to IPE intervention (Schwindt et al., 2017).

In a replication validation study of the ICCAS, Schmitz et al. (2017) again acknowledged the ICCAS as a sound instrument for self-assessed, interprofessional collaborative behaviors. In their study, investigators appraised the content validity of the ICCAS in a foundation course in

interprofessional collaboration among students in medicine, pharmacy, nursing, dentistry, veterinarian medicine, and public health (Schmitz et al., 2019). Similar to previous investigations, the authors used an EFA with a PAF, and Cronbach's alpha to investigate its internal (factor) structure and construct validity (Schmitz et al., 2017). Notably, self-assessed competency ratings were obtained from a much larger sample size (N=785) than previous studies using a retrospective, pre-post design (Schmitz et al., 2017). Similar to previous studies, the authors found moderate to large effect sizes for sixteen of the items on the scale. The two largest effects were seen in the areas emphasized most heavily by the course including factor 1 (understanding the abilities and contributions of team members) at 1.01, and factor 2 (learning from team members to enhance care) at 0.94 (Schmitz et al., 2019). The authors concluded that the ICCAS is a valid and reliable instrument that, at present, remains the criterion instrument in the assessment of interprofessional collaborative competency attainment (Schmitz et al., 2019).

Limitations

There were three significant limitations to the design of this study. First, the number of participants in the target population was relatively low (n=31). However, it is important to note that although the number of participants is low, it contains the entire population of professional athletic training students who have ever participated in the TEACH! curriculum. Therefore, students enrolled in their final year of the professional athletic training program in 2018-2019 and 2019-2020 at Indiana University-Bloomington represent the totality of all professional athletic training students who have ever participated in the TEACH! curriculum. Given that there are currently no data available on professional athletic training student's participating in this type of IPE experience, using the entire, albeit small, population was warranted.

The second limitation to this study is the lack of racial/ethnic diversity among professional athletic training students. Of the thirty-one participants, 77% identified as White (n=24), while only 23% identified as Black or African-American, Hispanic or Latino, or two or more races (n=7). This disparity is, unfortunately, an accurate representation of the racial/ethnic demographic across all professional athletic training students in the United States. According to the most recent (2018) analytics report from the CAATE, 78% of all professional athletic training students identify as White, 8% as Black or African America, 8% as Hispanic or Latino and 2% as two or more races (CAATEc, 2018). Although this disparity limits the ability to draw significant meaning from the data, it highlights the need to further examine diversity across the athletic training profession. To that end, no previous studies involving IPE or IPCP have examined race/ethnicity as a variable in student learning. The inclusion of race/ethnicity in this study was an important step toward including diversity in future IPE and IPCP research.

The most significant limitation of this study is the use of the ICCAS, and its retrospective pre-post design, for the assessment of the TEACH! curriculum. Ideally, the retrospective pre-post design is best suited for assessment immediately following a single IPE intervention. This eliminates the influence of confounding factors that may alter the participant's assessment of their interprofessional competency attainment. Previous studies using the ICCAS have been conducted primarily on single large-scale events in which participants have not engaged in anything other than the learning event between the pre and post-assessment. Conversely, when participants in the TEACH! curriculum complete the ICCAS they are being asked to recall their pre-intervention abilities over a much larger span of time. Typically, anchors one and four are separated by seven months. Accordingly, recall bias poses a greater threat to the retrospective pre-post design when used to assess a series of large-scale events than it does in other IPE

strategies. The ability of participants in the TEACH! curriculum to recall and assess their interprofessional collaborative competency seven months prior may be more difficult than it is for participants in single large-scale events that occur on the same day.

The duration of the TEACH! curriculum also allows for confounding factors to influence participants perceptions of their interprofessional collaborative competency. It is conceivable that after participants participate in each successive anchor, they become more aware of their interprofessional skills, and cognizant to use those skills. Notably, professional athletic training students are simultaneously engaging in 20 -25 hours of clinical education per week during their time in the TEACH! curriculum. Thus, by the time they complete anchor four and retrospectively assess their collaborative skills as they were before anchor one, it is possible their awareness of, and use of, interprofessional collaborative skills during their clinical education experiences could influence their assessment.

Another area of concern regarding the ICASS was the potential for social desirability bias among participants. Prior to participating in the TEACH! curriculum participants are oriented to IPE and IPCP by their faculty where the importance of IPE and IPCP to their respective fields are emphasized strongly. Hence, after participating in four anchors of the TEACH! curriculum, participants may feel a need to report “good behavior” and be compelled to rate themselves as improved to meet the expectations of their faculty.

Although the design of the TEACH! curriculum poses challenges to the retrospective pre-post assessment design, the use of the ICCAS remains warranted for several reasons. First, the ICCAS is presently accepted as the criterion tool in the assessment of interprofessional competency attainment. It is the only tool that has been repeatedly proven reliable and validated in the literature. Second, the increase in recall bias is mitigated by the reduction in response shift

bias seen in traditional pre-post assessments. Provided that participants are generally unaware of interprofessional collaborative practice prior to participation in an IPE learning event, the likelihood of overestimating or underestimating their self-reported skills in the pre-assessment remains high. A benefit of the retrospective pre-post assessment design is that the participants only see the items of scale and the prompts one time. This helps reduce effort justification in the post-assessment which may be dramatically skewed in a traditional pre-post design. For example, by the end of anchor four of the TEACH! curriculum, participants will have engaged in four learning events equating to approximately eight hours of contact time devoted exclusively to IPE. If participants are aware of the scale items and how they scored themselves in the pre-assessment, they may overestimate their effort and competency attainment in the post-assessment simply based on time to task. Additionally, the wording of the scale items and prompts of the ICCAS are designed to focus the participant directly on the learning activity. The questions are explicit in asking how they feel before and after the learning activities, directing their attention to the learning activity itself and away from other experiences that may confound their response. Despite its limitations, ICCAS and its retrospective pre-post design, remains the standard for assessing participants self-reported collaborative competency attainment, and was the most appropriate tool for answering the questions of this study.

Data Analysis

The purpose of this study was to assess the effectiveness of the TEACH! curriculum in interprofessional collaborative competency attainment among professional athletic training students. To do this, I analyzed ICCAS data for the population in two ways. First, I calculated the overall mean pre, and overall mean post, assessment scores across all 20 items of the ICCAS. I then employ a paired-samples t-test with Cohen's d to compare the means. Previous investigations

(Schmitz et al., 2017) found that the constructs of the ICCAS show considerable overlap, thus, calculating the overall mean pre and post scores in this manner was justifiable. Results were intended to show the overall change in participant's self-assessed interprofessional competency prior to and following participation in the TEACH! curriculum. Second, I calculated the overall mean pre, and overall mean post, assessment score for each individual item of the ICCAS. I then employed twenty, separate, paired-samples t-tests with Cohen's d to compare the overall means for each item. Results were intended to show changes in participant's self-assessed interprofessional competency on an item by item basis. Since each scale item corresponds directly to one or more of the four IPEC core competencies, analysis of data in this manner can determine participants change in each area of the IPEC core competencies.

In addition to examining the population as a whole, I also looked at three relevant sub-groups within the population, learning environment, gender, and racial/ethnic identity. To examine the effect of the learning environment, participants were placed into groups according to their cohort. Participants in the 2018-2019 cohort completed the TEACH! curriculum entirely in a traditional face to face environment, whereas the 2019-2020 cohort completed anchors one and two in the traditional face to face environment, and anchors three and four in the virtual environment. I analyzed the differences between the cohorts' in two ways. First, I employed two, separate, paired-samples t-tests with Cohens d to compare the overall mean pre, and overall mean post, assessment scores for each cohort. Second, I employed two, separate, independent samples t-tests with Cohens d to analyze differences in the overall mean pre, and the overall mean post, assessment scores between the cohorts. Results were intended to show the overall change in participant's self-assessed interprofessional competency both within and between each

cohort. This helped determine if the learning environment affected participant's self-assessed interprofessional competency attainment.

The same aforementioned analytical procedures were followed to examine differences based on gender. Participants were placed into groups according to their gender identity. For this study, all participants identified as one of two genders: cis-male, or cis-female. Like the previous analysis, I employed two, separate, paired-samples t-tests with Cohens d to compare the overall mean pre, and the overall mean post, assessment scores for each gender group. Second, I employed two, separate, independent samples t-tests with Cohens d to analyze differences in the overall mean pre-assessment and the overall mean post-assessment scores between gender groups. Results were intended to show the overall change in participant's self-assessed interprofessional competency both within, and between each gender group. This helped determine if differences exist between participant's self-assessed interprofessional competency attainments based on gender.

Likewise, the aforementioned analysis conducted for learning environment, and gender was also conducted for racial/ethnic identity. For this study, twenty-four participants identified as White, three as Black or African American, three as Hispanic or Latino, and one as two or more races. Due to the disproportionate representation within the population, participants were placed into two groups for analysis, White and Racial/Ethnic minorities. Like the previous analysis, I employed two, separate, paired-samples t-tests with Cohens d to compare the overall mean pre, and overall mean post, assessment scores for each racial/ethnic group. Second, I employed two, separate, independent samples t-tests with Cohens d to analyze differences in overall mean pre, and overall mean post, assessment between racial/ethnic groups. Results were intended to show the overall change in participant's self-assessed interprofessional competency both within and

between each racial/ethnic group. This can help determine if differences exist between participants self-assessed interprofessional competency attainments based on racial/ethnic identity.

In total, 33 separate t-tests were employed to assess participants pre and post scores on the ICCAS. This high number of tests significantly inflates the type I error rate, increasing the probability of falsely identifying a significant difference between variables (Jafari and Ansari-Pour, 2019). One solution to control type I error is to minimize the significance threshold (Jafari and Ansari-Pour, 2019). Therefore, the significance threshold for this study was set to $p<.01$.

Item number twenty-one of the ICCAS is an overarching question that asks participants to rate their general ability to collaborate interprofessionally following learning activities. This question is designed to be answered only as a post-assessment, and unlike the previous twenty items of the scale, is only answered one time. Therefore, responses to this question are presented as distribution data across the population, and the aforementioned sub-groups. Results were intended to determine the overall perception of participants self-reported ability to collaborate interprofessionally.

Post-secondary analysis of ICCAS data in the manner described was the most appropriate, and useful, strategy for answering the questions of this study. Examining existing data on the TEACH! curriculum was a critical first step in the evaluation of its effectiveness as an IPE strategy. Since participants in this study represent the totality of all professional athletic training who have ever completed the TEACH! curriculum, results provide a strong indication of the effectiveness of the TEACH! curriculum specific to this population, and contribute significantly to the knowledge base of IPE in the athletic training field.

Chapter IV: Results

The purpose of this study was to assess the effectiveness of the TEACH! curriculum in interprofessional collaborative competency attainment among professional athletic training students. To accomplish this, a secondary analysis of ICCAS data from thirty-one professional athletic training students enrolled in their final year of the professional athletic training program at Indiana University – Bloomington was conducted. These participants represent the entire population of professional athletic training students to have ever completed the TEACH! curriculum. Data analysis was designed to examine the population in four different ways. First, the population was examined as a whole, including an item by item analysis of the ICCAS, as well as an analysis of overall mean scores. Next, each of three relevant sub-groups of the population were examined including learning environment, gender, and racial/ethnic identity. For each sub-group, analysis was conducted to compare overall mean scores both between, and within groups. Due to the large number (33) of tests run in the study, the significance level was set at $p < .01$ for all tests to reduce the probability of a type I error.

To examine the population as a whole, I employed a paired-samples t-test with Cohen's d, to compare the overall mean pre-assessment score, and overall mean post-assessment score on the ICCAS across all participants (Table C1). Results indicate a significant difference between the overall mean pre-assessment score ($M=3.69$, $SD=.755$) and the overall mean post-assessment score ($M=4.41$, $SD=.531$); $t(30) = -7.41$, $p < 0.001$, with Cohen's d (1.33) demonstrating a large effect size. This suggests that, in a broad sense, participants rated their ability to collaborate interprofessionally significantly better following completion of the TEACH! curriculum.

In order to look closer at these results, I employed twenty, separate, paired-samples t-tests, with Cohen's d, to compare the overall mean pre-assessment score, and overall mean post-

assessment score for each individual item of the ICCAS (Table C2). Similarly, results indicate a significant difference in mean pre-assessment scores, and mean post-assessment scores for all twenty items of the ICCAS ($p < 0.01$). Likewise, a large effect size was demonstrated across all items with Cohen's d ranging from a low of .75 on item two, to a high of 1.19 on item nineteen (Table C2). This suggests that not only does the TEACH! curriculum appear to improve interprofessional competency across the population, but it also appears to adequately address each of the four IPEC core competencies uniformly throughout the curriculum. Overall, these results suggest that professional athletic training students rate their ability to collaborate interprofessionally significantly better following completion of the TEACH! curriculum.

Further analyses were conducted to examine differences between relevant sub-groups within the population including learning environment, gender, and racial/ethnic identity. For each sub-group, ICCAS data were analyzed for differences both within, and between groups. A paired-samples t-test with Cohen's d was used to compare the overall mean pre-assessment scores and the overall mean post-assessment scores within groups. Two, separate, independent t-tests with Cohen's d was used to compare the overall mean pre-assessment and the overall mean post-assessment scores between groups.

To examine the effect of learning environment, participants were separated into groups according to their cohort. Participants in the 2018-2019 cohort completed the TEACH! curriculum entirely in the traditional face to face environment, whereas the 2019-2020 cohort completed anchors three and four of the TEACH! curriculum in the virtual environment. For within group comparison, I employed two paired-samples t-tests to compare the overall mean pre-assessment scores and the overall mean post-assessment scores in participants from the 2019 and 2020 cohorts respectively (Table C3). Results indicate a significant difference in the overall

mean pre-assessment scores (M=3.74, SD=.736) and the overall mean post-assessment scores (M=4.35, SD=.499); t (15) = -4.92, $p < 0.001$ in participants from the 2019 cohort. Likewise, results indicate a significant difference in the overall mean pre-assessment scores (M=3.64, SD=.797) and the overall mean post-assessment scores (M=4.47, SD=.575); t (14) = - 5.58, $p < 0.001$ in participants from the 2020 cohort. Further, Cohen's d demonstrates a large effect size for both the 2019 (.88) and 2020 (1.01) cohorts. These results coincide with the results from the population analysis, and suggest that participants, regardless of learning environment, rate their ability to collaborate interprofessionally significantly better after participation in the TEACH! curriculum.

For between groups analysis, I employed two independent-samples t-tests to compare the overall mean pre-assessment scores and the overall mean post-assessment scores between participants from the 2019 and 2020 cohorts respectively (Table C4). Results indicate no significant differences in the overall mean pre-assessment scores between the 2019 cohort (M=3.74, SD=.736) and the 2020 cohort (M=3.64, SD=.797); t (29) =.376, $p = 0.710$. Likewise, there was no significant difference in the overall mean post-assessment scores between the 2019 cohort (M=4.35, SD=.499) and the 2020 cohort (M=4.47, SD=.575); t (29) =.573, $p = 0.571$. Further, Cohen's d demonstrates a small effect size for both the pre-assessment (.067) and the post-assessment (.10). These results indicate that there are no significant differences in participant's scores on the ICCAS between the 2019 and 2020 cohorts. This suggests that learning environment had no influence on participants self-reported interprofessional competency attainment.

The aforementioned analytical method was repeated to compare participants based on gender. Participants in this study all identified as one of two genders, cis-male, or cis-female.

Two paired-samples t-tests were conducted to compare the overall mean pre-assessment scores and the overall mean post-assessment scores in cis-male, and cis-female participants respectively (Table C5). Results indicate a significant difference between the overall mean pre-assessment scores (M=3.74, SD=.758) and the overall mean post-assessment scores for cis-males (M=4.48, SD=.439); t (10) = -3.87, p = 0.003. Likewise, results show a significant difference between the overall mean pre-assessment scores (M=3.67, SD=.771) and the overall mean post-assessment scores for cis-females (M=4.37, SD=.583); t (19) = -6.35, p < 0.001. Further, Cohen's d demonstrates a medium effect size for cis-males (.69) and a large effect size for cis-females (1.14). This difference in effect size is notable. Although it is not statically significant, it emphasizes the need for a larger sample size in future investigations.

To compare groups, two independent-samples t-test were conducted to compare the overall mean pre-assessment scores and the overall mean post-assessment scores between cis-male and cis-female participants respectively (Table C6). Results indicate no significant difference in the overall mean pre-assessment scores between cis-males (M=3.74, SD=.758) and cis-females (M=3.67, SD=.771); t (29) = 2.62, p = 0.795. Likewise, there was no significant difference in the overall mean post-assessment scores between cis-males (M=4.48, SD=.4.39) and cis-females (M=4.37, SD=.5.83); t (29) =.529, p = 0.601. Further, Cohen's d demonstrated a small effect size for both the pre-assessment (.047) and the post-assessment (.094). Similar to the within groups comparison, this difference is not statically significant, but is nonetheless notable as it highlights the need for a larger sample size in future research. Overall, these results align with both the population, and the cohort analysis, and suggest that gender (cis-male versus cis-female) had no influence on participants self-reported interprofessional competency attainment.

The aforementioned analytic strategy was repeated once more to compare participants based on racial/ethnic identity. A significant limitation to this study was the lack of racial and ethnic diversity among professional athletic training students. Of the thirty-one participants in the study, twenty-four participants identified as White, three as Black or African-American, three as Hispanic or Latino, and one as two or more races. Due to the disproportionate representation of racial/ethnic minorities within the population, participants identifying as Black or African American, Hispanic or Latino, and two or more races were grouped together for analysis. For within group analysis, two paired-samples t-tests were conducted to compare the overall mean pre-assessment scores and the overall mean post-assessment scores in White participants, and participants identifying as racial/ethnic minorities respectively (Table C7). Results indicate a significant difference in the overall mean pre-assessment scores (M=3.71, SD=.732) and the overall mean post-assessment scores (M=4.38, SD=.546); $t(23) = -6.00$, $p < 0.001$ in White participants. Likewise, results show a significant difference in the overall mean pre-assessment scores (M=3.62, SD=.888) and the overall mean post-assessment scores (M=4.50, SD=.507); $t(6) = -4.53$, $p = 0.004$ in participants identifying as racial/ethnic minorities. Further, Cohen's d demonstrates a large effect size for both the White participants (1.07) and participants identifying as racial/ethnic minorities (.81). Similar to the gender analysis, the difference in effect size is not statically significant, but is nonetheless notable as it emphasizes the need for a larger sample size in future investigations.

For between groups analysis, two independent-samples t-tests were employed to compare the overall mean pre-assessment scores and the overall mean post-assessment scores between White participants and participants identifying as racial/ethnic minorities respectively (Table C8). There was no significant difference between the overall mean pre-assessment scores for

White participants (M=3.71, SD=.732) and participants identifying as racial/ethnic minorities (M=3.62, SD=.888); t (29) =.267, p = 0.791. Likewise, there was no significant difference in the overall post-assessment scores between White participants (M=4.38, SD=.546) and participants identifying as racial/ethnic minorities (M=4.5, SD=.507); t (29) =.486, p = 0.630. Further, Cohen's d demonstrates a small effect size for both the pre-assessment (.047) and post-assessment (.087). Similar to the within groups comparison, this difference is not statically significant, but is nonetheless notable as it highlights the need for a larger sample size in future research. These results appear align with the population, cohort, and gender analysis, and suggest that participants racial/ethnic identity had no influence on their self-reported interprofessional competency attainment. However, the low number of participants in the study, along with the disproportionate distribution of participants across racial/ethnic groups, limits the ability to fully substantiate this claim. Still, the results of this analysis are important as they further emphasize the glaring lack of diversity among professional athletic training students.

The final item of the ICCAS is an overarching question that asks participants to rate their general ability to collaborate interprofessionally following all learning activities. This question is designed to be answered only in the post-assessment, and unlike the previous twenty items of the scale, is only answered once. In response to the prompt, *"Compared to the time before the learning activities, would you say your ability to collaborate interprofessionally is…,"* 62% of all participants responded *"Much better now"*, 35% responded *"Somewhat better now"*, and 3% responded *"About the same"* (Fig. D1*).* Among participants in the 2018-19 cohort, who completed the TEACH! curriculum entirely in the traditional face to face environment, 44% responded *"Much better now"*, 44% responded *"Somewhat better now"*, and 12 % responded *"About the same"* (Fig. D2). Among the 2019-20 cohort who completed anchors three and four

of the TEACH! curriculum in the virtual environment, 60% responded *"Much better now"*, 27% responded *"Somewhat better now",* and 13 % responded *"About the same"* (Fig. D2). Among cis-male participants, 45% responded *"Much better now"*, 36% responded *"Somewhat better now"*, and 19 % responded *"About the same"* (Fig. D3). Among cis-female participants, 55% responded *"Much better now"*, 35% responded *"Somewhat better now"*, and 10 % responded *"About the same"* (Fig. D3*).* Among White participants, 50% responded *"Much better now"*, 33% responded *"Somewhat better now",* and 17 % responded *"About the same"* (Fig. D4). Among participants identifying as racial/ethnic minorities, 57% responded *"Much better now"*, and 43% responded *"Somewhat better now"* (Fig. D4).

These results suggest that the majority of professional athletic training students rate their ability to collaborate interprofessionally either much better, or somewhat better, following completion of the TEACH! curriculum. Nearly all sub-groups followed a similar distribution pattern as the population with a strong majority of participants responding, *"Much better now"*, and very few responding *"About the Same"* or worse. The only diversion to this distribution was the 2019 cohort who reported a more even distribution with 45% of participants responding *"Much better now"* and 45% responding *"Somewhat better now"*. Interestingly, this distribution increased in the 2020 cohort with 60% responding *"Much better now"* and 27% responding *"Somewhat better now."* Also, less than 20% of participants across the population reported *"About the Same"* and 0% reported *"Somewhat worse now"* or *"Much worse now"*. These data correspond to the previous analysis of ICCAS scale items, and suggests that on a population level, the TEACH! curriculum appears to effectively improve self-reported interprofessional competency among professional athletic training students. These data also suggest that participant responses to item #21 are not significantly different based learning environment,

gender, or racial/ethnic identity. This too further supports the previous analysis of ICCAS scale items by suggesting there are no differences in participant responses based on these sub-groups.

Overall, secondary analysis of ICCAS data reveals that, as a population, professional athletic training students rate their ability to collaborate interprofessionally significantly better after participation in the TEACH! curriculum. Notably, scores on the ICCAS significantly improved both on an overall scale, and on an individual item by item scale. This suggests that not only is the curriculum effective in delivering interprofessional competency as a whole but is also effective in uniformly addressing each of the four IPEC core competencies. The data further indicates that participant responses do not differ with regard to learning environment or gender. It is critical to note, however, that although the results likewise suggest that race/ethnicity did not influence participants scores, the lack of diversity within the population and low number of participants hinders the ability to substantiate this claim.

Chapter 5: Discussion

The purpose of this study was to assess the effectiveness of the TEACH! curriculum in interprofessional competency attainment among professional athletic training students. At present, there is little scholarship in the athletic training field regarding IPE and IPCP. With the implementation of the CAATE's 2*020 Standards for Accreditation of Professional Athletic Training Programs,* athletic training educators and administrators are now mandated to implement IPE into the curriculum. With a dearth of evidence available regarding best practices for IPE, several strategies to accomplish this have emerged. The TEACH! curriculum is a unique IPE strategy insofar as it is the only IPE strategy to uniformly deliver the IPEC core competencies over a series of large-scale learning events. However, to date, no literature exists regarding the effectiveness of this curriculum.

Data Analysis

To assess the TEACH! curriculum, I conducted a secondary analysis of ICCAS data from professional athletic training students at Indiana University-Bloomington. Presently, the ICCAS is the only reliable and valid measure of interprofessional competency attainment available, and is therefore the criterion measure of interprofessional competency attainment. Further, students at Indiana University-Bloomington are the only professional athletic training students that have ever participated in the TEACH! curriculum. In addition to analyzing this population as a whole, I examined differences by three characteristics within the population: learning environment, gender and racial/ethnic identity. Due to the large number (33) of tests run in the study, significance level was set at $p<.01$ to reduce the probability of incorrectly reporting a significant difference between scores.

In academic year 2019-2020, due to the COVID-19 global pandemic, anchors three and four of the TEACH! curriculum were offered the virtual environment. This permitted comparison of learning environments between the 2020 cohort, and the 2019 cohort all of whom completed all four anchors of the TEACH! curriculum in the traditional face to face environment. No previous investigations regarding IPE have considered gender or race/ethnicity as a variable in student learning. Current literature in the healthcare field recognizes the effects of gender and race/ethnicity in explicit and implicit bias among practicing health care providers. However, no studies have examined how gender and race/ethnicity influence collaborative practice and education. Analysis of ICCAS data through the lens of these demographics is therefore a critical step in understanding the role of gender and race/ethnicity in interprofessional education and collaboration.

The results of this study demonstrate that across the population participants self-reported their interprofessional competency at significantly higher levels after participating in the TEACH! curriculum. When examining the ICCAS data overall, all participants self-reported improved interprofessional collaborative competency when comparing their mean pre-assessment scores and their mean post-assessment scores. The significant increase ($p<.001$) and large effect size (1.33) between the pre and post-assessment suggests that as a whole, the TEACH! curriculum effectively improved participant's interprofessional collaborative competency. A deeper analysis of the ICCAS on an item by item basis further reinforces this finding. Analysis of each scale item as a separate entity also demonstrated significant improvement. Each of the twenty items showed a significant increase between the pre and post-assessment. Further, each individual effect size remained large with a range of .75 to 1.19. The consistency in the item by item analysis is notable as it demonstrates that not only is the

TEACH! curriculum effective as a whole, but also on a smaller, item by item level. Since the ICCAS was designed to uniformly evaluate all four IPEC core competencies, and given that each item of the ICCAS directly corresponds to one or more of these competencies, these findings suggest that the TEACH! curriculum effectively and uniformly addresses all four of the IPEC core competencies.

Further analysis of ICCAS data showed no significant difference between or within participants based on learning environment, gender, or race/ethnicity. When comparing participants based on learning environment, both the 2019 cohort and the 2020 cohort demonstrated significant improvement when comparing the pre-assessment and post-assessment scores. Similar to the population analysis, both cohorts demonstrated significance at $p<.001$ and large effect sizes of .88 and 1.01 respectively. However, between the groups, there was no significant differences at the pre-assessment or the post-assessment. These findings suggest that the learning environment had no influence on participants self-reported interprofessional competency attainment. Anecdotally, the design and structure of the TEACH! curriculum would appear to be more effective if experienced entirely in the traditional face to face environment. Particularly in regard to communication and conflict resolution, face to face interaction would seem to be the better environment to address these concepts. However, as the health care field continues to embrace the virtual environment, and things such as tele-health, and virtual patient visits become more prominent, the ability of health care providers to work interprofessionally in the virtual environment is critical. These results indicate that the TEACH! curriculum is effective in developing interprofessional competency regardless of learning environment.

An important aspect of this study was to examine professional athletic training student's interprofessional competency attainment through the lens of gender and race/ethnicity. Within

the literature regarding IPE in athletic training education, no studies have considered these demographics as variables in student learning outcomes. Similar to the analysis of learning environment, results of this study showed no significant differences in ICCAS data between or within participants based on gender, or race/ethnicity. Both cis-males ($p=.003$) and cis-females ($p<.001$) demonstrated significant increases between the pre-assessment and post-assessment. Further, no significant differences were found between cis-males and cis-females in the pre-assessment or the post-assessment, but differences in effect size (.69 for cis-males, and 1.14 for cis-females) were notable. This difference, although not statically significant, highlights the need for a larger sample size in future research. With regard to race/ethnicity, results were nearly identical. Both White participants ($p<.001$) and Racial/Ethnic minority participants ($p=.004$) demonstrated significant increase between the pre-assessment and post-assessment. Like previous analyses, no significant differences were found between White participants and Racial/Ethnic minority participants in the pre-assessment or the post assessment. Effect sizes for both White participants and Racial/Ethnic minority participants remained large at 1.07 and .81 respectively. Although these results appear to suggest that race/ethnicity did not influence participants ability to gain interprofessional competency, the lack of diversity within the sample and the low number of total participants hinders the ability to substantiate this claim. These findings do however emphasize the need for a larger and more diverse sample size in future research.

An important aspect of addressing explicit and implicit bias in health care is to improve the knowledge and understanding of each other's roles and responsibilities and to improve communication and conflict resolution between groups with different backgrounds. The design of the TEACH! curriculum as a series of large-scale events provides the time and space to

address these issues directly. In particular, anchors one and two are specifically designed to address roles and responsibilities and conflict resolution. These core competencies are purposely implemented first in the curriculum as they provide a critical foundation for effective teamwork. The mutual understanding of one another's roles and responsibilities can help mitigate bias that may otherwise develop. The results of this study are promising in that it appears that participants self-reported interprofessional competency attainment is not influenced by gender and race/ethnicity. However, in order to strengthen this claim a larger and more diverse sample of participants is needed.

The final item of the ICCAS, question #21, asked participants to rate their overall ability to collaborate interprofessionally after all learning activities. The majority of participants, regardless of learning environment, gender or race/ethnicity rated their ability to collaborate interprofessionally as either much better, or somewhat better, following completion of the TEACH! curriculum. These data further support the aforementioned arguments that on a broad level, the TEACH! curriculum appears to effectively improve self-reported interprofessional competency among professional athletic training students.

Interpretation of Results

The results of this study coincide with previous IPE investigations involving athletic training students in one significant way. It appears as though simply engaging in an IPE learning event, regardless of format or duration, increases participants knowledge of peer health care providers roles and responsibilities. In their 2016 study of a multicourse IPE project, Jutte et al. (2016) found that students in nursing, health administration, and athletic training reported increased knowledge regarding other health care professions in general, and how their discipline differed from other health care disciplines. Similarly, Sniffen et al. (2019) found that case-based

learning among athletic training and physical therapy students in existing co-curricular courses also increased their knowledge of peer health care professions. Recently, in an investigation of a 17-day immersive study abroad experience for students from seven different health care professional programs, Manspeaker and Wallace (2019) also found that shared experiences effectively enabled students to understand the roles and responsibilities of one another, and may enhance their preparation for collaborative practice in the future. The results of this study coincide with these prior investigations in finding that participants report improved understanding of the roles and responsibilities of peer health care providers. Notably, in the item by item analysis of the ICCAS, items 8, 9, 10, 11, 12, 16, and 17 (Fig. B1), all improved significantly. These items correspond most directly to the roles and responsibilities portion of the IPEC core competencies. Therefore, at minimum, the TEACH! curriculum appears to be on par with other IPE strategies in the athletic training field as it pertains to this critical area of interprofessional collaboration.

Conversely, the aforementioned studies did not address the influence of their respective IPE strategies on the other IPEC core competencies, values and ethics, teams and teamwork, and interprofessional communication. The types of IPE strategies used in these investigations did not allow for adequate implementation or assessment of all competencies. With the exception of the study abroad experience described by Manspeaker and Wallace (2019), the IPE strategies used in these studies were isolated to a single project or case-report within an existing course. These strategies are limited in their capacity to adequately address all of the IPEC core competencies primarily due to the limited exposure time and depth of interprofessional learning. The TEACH! curriculum, as a series of large-scale events, was specifically designed to address each of the IPEC core competencies progressively over time. The strength of this design is that it creates

time and space for participants to gradually learn about and use interprofessional knowledge and skill. Accordingly, the results of this study consistently demonstrate improvement in each scale item of the ICCAS. This suggests that the TEACH! curriculum may be more effective at uniformly addressing all of the IPEC core competencies than other IPE strategies currently being used in the field.

Previous IPE studies that did not involve athletic training students have primarily examined two types of IPE strategies, single, large-scale events, and IPE specific courses. Notably, results of these investigations yield similar conclusions as those that have involved athletic training students. Both single, large-scale events, and IPE specific courses appear to improve participants understanding of one another's roles and responsibilities, and improve their appreciation for interprofessional collaborative practice, but do little to address the other IPEC core competencies. In an examination of student's expectations and experiences following a single, large-scale IPE event, Rosenfeld, Oandasan and Reeves (2011) found that students demonstrated an understanding of the value of IPE, and found that interacting with health care students from other fields increased their understating of each other's roles and responsibilities. However, students also reported that single, large-scale events felt disorganized, which affected their ability to work as a team (Rosenfeld, Oandasan & Reeves, 2011). In examining the effectiveness of an IPE specific course, Reubling et al. (2014) also found that students who completed the course were more engaged in interprofessional collaboration, had a better understanding of peer health care providers, and held a more positive view toward IPE than their peers who did not take the course (Reubling et al., 2014). Similarly, Rahman et al., (2014) found that nutrition and dietetics students enrolled in an IPE specific course exhibited a greater understanding of other health care fields, and greater confidence in building relationships with

other allied health care professionals after having taken the course (Rahman et al. 2014). Bultas et al. (2018) echoed these results in their qualitative document analysis of students written reflections about their experiences in an introductory IPE course. Their results show that an introductory IPE course can improve students understanding of the health care system in the United States, and thus improve their ability to communicate and collaborate with one another (Bultas et al. 2018). Eliot et al. (2018) further supported these ideas and recommended the inclusion of an IPE course in health care education curricula in their study examining the effectiveness of an introductory IPE course in improving students' collaboration skills. The results of this study support this consensus that involvement in IPE, regardless of format or duration, appears to have a significant impact on improving participants understanding of the roles and responsibilities of peer health care providers.

Similar to the studies that involved athletic training students, the IPE strategies used in the aforementioned studies likewise do not address all of the IPEC core competencies uniformly. Results of these investigations clearly suggest that both single, large-scale events, and IPE specific courses are effective in improving awareness of the roles and responsibilities of peers and appreciating the value of collaborative practice. However, no prior investigations have been able to make claims related to the other IPEC core competencies. The results of this study once again suggest that the TEACH! curriculum uniformly addresses all of the IPEC core competencies. Therefore, the TEACH! curriculum may be more a more effective strategy to address the breadth of the IPEC core competencies than other IPE strategies currently being used in peer health care education programs.

Limitations

The results of my study strongly suggest that the TEACH! curriculum is an effective IPE strategy for interprofessional collaborative competency attainment among professional athletic training students. When compared to other IPE strategies, the TEACH! curriculum appears to more effectively improve interprofessional collaborative knowledge and skill uniformly across the IPEC core competencies. Further, the TEACH! curriculum also appears to effectively improve participants self-reported level of interprofessional collaborative competency regardless of learning environment, gender or race/ethnicity. However, when interpreting these results several factors including the small population size, the lack of diversity within the population, and the merits of the retrospective pre-post design must be considered.

In total, ICCAS data from thirty-one professional athletic training students were analyzed. Generally speaking, this is a low number of participants from which to conduct statistical analysis and draw meaningful conclusions. However, the thirty-one participants in this study represent the entire population of interest. The TEACH! curriculum is a unique IPE strategy created for, and implemented by, the health professions schools and programs of Indiana University. Students enrolled in the professional athletic training program at Indiana University – Bloomington in academic years 2018-2019 and 2019-2020 are the only professional athletic training students to have ever completed the TEACH! curriculum. Although analysis and conclusions from such a small group is limited, it is the only group presently available to answer the questions of this study.

This study was the first of its kind to examine gender, and race/ethnicity as a variable in interprofessional collaborative competency attainment. The positionality of participants based on gender and race/ethnicity as they experienced collaborative learning is a missing piece in the IPE

literature. Current literature on patient outcomes, and health care provider experiences, suggest that implicit and explicit bias play a significant role in health care delivery and patient outcomes. The health care provider's positionality based on gender and racial/ethnic identity can factor greatly into how they perceive peer health care providers, and how they are perceived by others. Misconceptions between providers based on gender and race/ethnicity can therefore exacerbate bias, negatively affect patient outcomes and influence the experience of the health care provider. A key element in interprofessional collaborative practice and education is improving the understanding of each other's roles and responsibilities and developing strong communication and conflict resolution skills to mitigate such bias. These elements are essential in the development of an effective interprofessional health care team. Therefore, assessing how participants self-report their ability to collaborate interprofessionally based on gender and race/ethnicity is crucial in understanding how these factors may or may not contribute to developing effective collaborative skills.

In this study eleven participants (35%) identified as cis-male and twenty (65%) identified as cis-female. With regard to race/ethnicity, twenty-four participants identified as White (77%), three as Black or African-American (10%), three as Hispanic or Latino (10%), and one as two or more races (1%). These ratios are consistent with population norms across all professional athletic training students in the United States. According to the most recent CAATE analytics data, 63.2 % of all professional athletic training students identify as cis-female and 37.8% identify as cis-male (CAATEc, 2018). Further, 78% identify as White, 8% as Black or African America, 8% as Hispanic or Latino and 2% as two or more races (CAATEc, 2018). Therefore, the gender and racial/ethnic ratios captured in this study are a near perfect microcosm of total population of all athletic training students in the United States. Although the sample obtained in

this study is an accurate depiction of the demographics of professional athletic training students, it is a concerning trend and speaks to the need to address diversity within the profession.

The limited number of racial/ethnic minorities in this this study must be taken into account when assessing the results of this study. In order to conduct statistical analysis, racial/ethnic minorities were group together, and treated as a single group. While this provided the ability to conduct a better statistical analysis, caution must be taken when extrapolating meaning from the data. With only seven participants representing a variety of racial/ethnic groups, it is difficult to project these findings across all racial/ethnic minorities in professional athletic training programs. Further, grouping racial/ethnic minorities together eliminates differences that may exist between them, and perpetuates the chasm between racial/ethnic minorities and their white counterparts. These issues notwithstanding, evaluating the data in this manner was the most appropriate and logical approach for this study. Given that the participants in this study represent the entire population of professional athletic training to have ever completed the TEACH! curriculum, and provided that the ratios of gender and race/ethnicity are very closely aligned with population norms, analysis of data in this manner was the only viable option. What remains clear, however, is how the lack of diversity in this study is a telling indictment of the athletic training profession at large. These results highlight the need for more inclusion and diversity efforts within the profession, especially as it pertains to the recruitment of professional athletic training students.

Although the data on gender and race/ethnicity was limited, the results are nonetheless informative. It appears that gender and race/ethnicity did not influence participant's self-reported interprofessional collaborative skill attainment, however as previously discussed, these results must be placed within the proper context. These data provide useful insight in assessing how

effective the TEACH! curriculum is in developing interprofessional skill as a mechanism to curb explicit and implicit bias. However, in order to make a more meaningful claim regarding gender and race/ethnicity, a larger sample size is needed. In order to do that, the athletic training profession as a whole will need to continue to develop better strategies toward diversity and inclusion.

The retrospective pre-post design of the ICCAS is another factor that must be taken into account when considering the results of this study. The rationale for using a retrospective pre-post design, as opposed to a traditional pre-test-post-test design, is to provide an expeditious method for assessing the effectiveness of a single program or intervention (Klatt & Taylor-Powell, 2005). Previous studies found that the retrospective pre-post design allows for a more subjective assessment of learning without sensitizing the learner to the subject matter with a prequestionnaire (Bhanji et al., 2012), and produces a more legitimate assessment of program outcomes than the traditional pre-test-post-test methodology (Pratt et al., 2000). Further, traditional pre-test self-reports have been shown to influence participant's perception of what the intervention will cover thus creating a response shift-bias. Pratt et al., (2000) found that when response shift bias was present, traditional pre-test-post-test comparisons resulted in an underestimation of program effects and that the retrospective pre-post designs appear to reduce response shift bias and pre-program assumptions (Pratt et al., 2000). Accordingly, the ICCAS was designed as a post-program data collection strategy in which post-test and retrospective pre-test data are collected to assess the change in interprofessional collaboration-related competencies in healthcare students and practicing clinicians before and after IPE training interventions (MacDonald et al., 2010). The ICCAS is therefore best suited for assessment

immediately following an IPE intervention, thus eliminating the influence of confounding factors that may alter the participant's assessment of their interprofessional competency attainment.

The use of the ICCAS following anchor four of the TEACH! curriculum ventures away from the original intended use of the scale. When participants in the TEACH! curriculum complete the ICCAS they are being asked to recall their pre-intervention abilities over a significant span of time. For the professional athletic training students examined in this study, anchors one and four were separated by approximately seven months. Accordingly, recall bias poses a greater threat to the retrospective pre-post design in this study than it may in other studies that have used the ICCAS. The ability of participants in the TEACH! curriculum to recall and assess their interprofessional collaborative competency seven months prior may be significantly more difficult than for participants who complete a single large-scale IPE within the same day.

One of the strengths in the design of TEACH! curriculum is the ability to infuse the IPEC core competencies uniformly over time throughout the participant's course of study. Results of this study clearly demonstrate that the implementation of a series of large-scale events throughout the curriculum permits the time and space needed to effectively, and uniformly, address all of the IPEC core competencies. Conversely, the length of time it takes to complete the TEACH! curriculum also allows for confounding factors to influence participants perceptions of their interprofessional collaborative competency. It is conceivable that while participants are completing each successive anchor, concurrent experiences make them more aware of interprofessional collaboration. For example, the professional athletic training students in this study are simultaneously engaging in 20-25 hours of clinical education per week while participating in the TEACH! curriculum. Thus, by the time they have completed anchor four, and

retrospectively assess their collaborative skills prior to anchor one, it is likely their awareness of, and use of, interprofessional collaborative skills during their clinical experiences could influence their assessment of their interprofessional competency. Therefore, it is difficult to ascertain whether or not the significant increases in ICCAS scores seen in this study are directly related to the participant's involvement in TEACH! curriculum, and not influenced by concurrent clinical experiences.

Another significant drawback to the use of the ICCAS is the potential for social desirability bias among participants. Prior to participating in the TEACH! curriculum, participants are required to be oriented to interprofessional practice and education by faculty from their own field. During this orientation the importance of IPE to the participants respective field is strongly emphasized. As previously mentioned, the span of time from orientation until the completion of anchor four when the ICCAS is administered is approximately seven months. During this time participants have been engaging in clinical education and spent considerable time in the TEACH! curriculum focusing on interprofessional collaboration. Therefore, it stands to reason that by the time participants complete the ICASS after anchor four, they may feel compelled to rate themselves higher to "do good" and meet the expectations of their faculty. Although this threat of social desirability bias must be considered when using the ICCAS in this manner, there is no reason to believe that social desirability bias affects participants differently based on gender or race/ethnicity. There is nothing inherently unique or noteworthy about the ICCAS, or the TEACH! curriculum that would lead one to believe than a participant's gender or race/ethnicity would influence how they believe they are expected to answer.

Although the design of the TEACH! curriculum poses challenges to the intended use of retrospective pre-post design, the use of the ICCAS for this study remains warranted for several

reasons. First, the ICCAS is universally accepted as the criterion assessment of interprofessional competency attainment. At present, it is the only tool that has been repeatedly proven reliable, and validated in the literature. The items of scale are purposely designed to uniformly address all of the IPEC core competencies, and thus provides the most robust and thorough assessment available. Second, the increased potential for recall bias is mitigated by the reduction in response shift bias seen in traditional pre-test-post-test assessments. Professional athletic training students are generally unaware of the nomenclature and terminology of interprofessional collaborative practice prior to participating in the TEACH! curriculum. The likelihood of overestimating or underestimating their self-reported interprofessional competency in a traditional pre-test-post-test design would therefore be high. If participants were to see, and not completely understand, the questions in the pre-assessment they may tend to underestimate their collaborative competency. Likewise, once they have been immersed in the TEACH! curriculum they may overestimate their interprofessional competency in the post-assessment. The inherent benefit of the retrospective pre-post design is that the participants only see the scale items and prompts one time. This helps reduce effort justification that may be dramatically skewed in a traditional pre-test-post-test design. Further, the wording of the prompts on the ICCAS are designed to focus the participant's responses toward the learning activity. The first prompt states *"Before participating in the learning activities, I was able to:"* and the second prompt states *"After participating in the learning activities, I was able to:"* The final prompt, question #21, states *"Compared to the time before the learning activities, would you say your ability to collaborate interprofessionally is…"* These prompts attempt to be explicit in directing the participant's attention to the learning activity itself and away from other experiences that may confound their response.

Despite its limitations, the ICCAS, along with its retrospective pre-post design, remains the best method for assessing the TEACH! curriculum. At present, it is the most valid, reliable and thorough assessment of the IPEC core competencies available, and therefore, provides the most meaningful data regarding interprofessional competency attainment. Due to the scarcity of IPE literature in the athletic training field, and provided that no previous studies involving the ICCAS have involved athletic training students, secondary analysis of ICCAS data of professional athletic training students was the most appropriate method for answering the questions of this study.

Future Research

The overarching objective of this study was to determine if the TEACH! curriculum is an effective IPE strategy for professional athletic training students. Due to the limited scholarship available in the athletic training field regarding IPE, and the lack of published data on the TEACH! curriculum, this study serves as an important first-step in that pursuit. Although the results of this study strongly suggest that participants effectively developed interprofessional collaborative competency after participating in the TEACH! curriculum, further investigation is warranted. To extrapolate the findings of this study, future investigations should focus in two areas. First, assessment of the TEACH! curriculum should be expanded to create a more robust and accurate depiction of the curriculum. This should include expanding the participant pool, increasing the frequency of assessment, and comparing the TEACH! curriculum to other IPE strategies. Second, the translation of interprofessional collaborative competency to actual clinical practice for professional athletic training students should be explored. Within this context, learning environment, the positionality of professional athletic training students based on gender

and race/ethnicity, and the overall lack of diversity within the athletic training field all warrant further investigation.

The results of this study strongly suggest that professional athletic training students significantly improved their interprofessional collaborative competency after participating in the TEACH! curriculum. These results, however, cannot be extrapolated to all participants who complete the TEACH! curriculum. In total, over 1,000 students from seventeen different health care professions participate in the TEACH! curriculum each academic year (IU IPEC, 2020). The didactic and clinical background of these students differ considerably. Future investigations, therefore, should consider using the methodology of this study to conduct a similar evaluation of students from the other participating health care professions. Comparing the results of this study to other health care students would create a more authentic assessment of the TEACH! curriculum as an IPE strategy across a variety of health care professions.

A significant limitation of this study was the low number of participants. Because the focus of this study was to specifically examine the TEACH! curriculum as it pertains to professional athletic training students, it was appropriate to only include this population. However, future investigations may consider using the methodology of this study to evaluate all TEACH! curriculum participants as one group. This would provide a larger sample size from which to draw more meaningful conclusions about the overall effectiveness of the TEACH! curriculum across all participants and health degree programs.

Another limitation to this study was the retrospective pre-post design of the ICCAS. Specifically, the use of the ICCAS following anchor four increased the likelihood of recall bias among participants. The retrospective pre-post design is best suited for assessment immediately following a single learning activity. Future studies should consider administering the ICCAS

after each individual anchor. This would allow for each anchor to be assessed as a separate learning activity, thus decreasing recall bias, and using the ICCAS as it was intended. It would also allow for comparison between anchors, and aid in evaluating how effectively each individual anchor addressed the IPEC core competencies. Additionally, this strategy would further permit the comparison of ICCAS scores for individual participants, and subgroups of participants, as they progress through the curriculum. Rather than a single set of ICCAS data, this would create four data sets, allowing interprofessional collaborate competency to be tracked over time.

A noted strength of the TEACH! curriculum design is the progressive implementation of the IPEC core competencies. The results of this study demonstrate that after completing four anchors of the TEACH! curriculum, participants improved their interprofessional collaborative competency uniformly across all of the IPEC core competencies. These results were unique as previous studies examining other IPE strategies have failed to demonstrate similar results. IPE strategies such as co-curricular courses, single large-scale events, within-course projects, case reports, and study abroad experiences have all reported improvements in understanding of the roles and responsibilities of others, but did not demonstrate improvement in the other competency areas. Future investigations should, therefore, consider comparing the TEACH! curriculum and other IPE strategies directly. In particular, the TEACH! curriculum should be compared with IPE strategies that use the ICCAS as an assessment tool. Results of such an investigation can be influential in determining best practices for IPE strategies moving forward.

The TEACH! curriculum as a whole is comprised of six learning anchors, however, the IU IPEC only administers anchors one through four. The development, implementation, and assessment of anchors five and six are at the discretion of individual programs. These anchors

are considered entry-to-practice events that facilitate learner's participation in team-based care during actual work in the professional environment (IU IPEC, 2020). These anchors have the potential to create an environment that allows participants to work in real clinical situations, while simultaneously incorporating interprofessional collaborative skills. At present, neither the professional athletic training program at Indiana University – Bloomington, nor the athletic training profession at large, have developed anchors five and six. The lack of anchors five and six creates a noticeable gap in the translation of interprofessional skill from didactic instruction to clinical practice. Accordingly, future IPE scholarship in athletic training should strongly consider creating and developing anchors five and six for professional athletic training students. The results of this study strongly suggest that anchors one through four provide participants with improved interprofessional collaborative competency. However, these results are isolated to the learning activities provided through these anchors. There is no mechanism in place to evaluate how the knowledge and skill acquired in the TEACH curriculum translates to clinical practice. Thus, the creation, development and subsequent assessment of anchor's five and six can add invaluable insight into the effectiveness of the TEACH! curriculum. Once these anchors have been fully realized, future investigations should consider developing assessment strategies that align with previous anchors. Specifically, future studies that can develop anchors five and six, and use the ICCAS to evaluate competency attainment, will be able to add significant weight to the viability of the TEACH! curriculum as an IPE strategy.

The results of this study consistently demonstrated that participants, regardless of learning environment, gender or race/ethnicity, significantly improved interprofessional competency following participation in the TEACH! curriculum. Moreover, the results were not only statistically significant, but were so by a large margin. Effect sizes, both from a population

and within group's standpoint, were all large, with exception of the cis-males sub-group that reported a medium effect size (.69). With such overwhelmingly strong data, the next logical step is to identify the specific factors of the TEACH! curriculum that led to such strong improvements in interprofessional collaborative competency. To accomplish this, future investigations should consider an inductive follow-up study capturing qualitative data from participants in this study. Specifically, a focus group, or a facilitated peer-to-peer discussion format, could facilitate meaningful discourse regarding participants experiences in the TEACH! curriculum. This type of inductive analysis would provide a deeper level of context, and meaning to the current data set. In particular, questions developed around each of IPEC core competencies could be triangulated with the quantitative data from each item of the ICCAS to extrapolate exactly how effective the TEACH! curriculum was in each competency area. Additionally, most of the participants in this study are now employed, and practicing as athletic trainers. A qualitative methodology could also be used to determine how the interprofessional competency gained in the TEACH! curriculum translated to participants clinical practice, and their ability to work collaboratively with peer health care professionals once they entered the field.

To date, very few studies involving IPE have used a qualitative methodology. This approach has the potential to add critically important information to the IPE knowledge base. As noted by Olson and Bialocerkowski (2014), IPE in health care is caught in an epistemological struggle between the principles of biomedical science, and education. On one hand, biomedical sciences attempt to objectify the experience and assign numerical value to learning progression, whereas education tends to focus more on the perceptions and experience of the individual student (Olson & Bialocerkowski, 2014). The inductive approach to examining the context of

the TEACH! curriculum can provide a deeper, and perhaps more meaningful assessment of the effectiveness of the TEACH! curriculum. Further, this approach is also best suited to expand the conversation regarding learning environment, gender and race/ethnicity. Importantly, results of this study showed no statistically significance differences between groups based on learning environment, gender or race/ethnicity. In fact, all between-groups analysis showed very small effect sizes ranging from a low of .047 to a high of .097. When considering these data, however, it is critical to consider the context. Extrapolating this data to mean that learning environment, gender and race/ethnicity have no effect on interprofessional competency attainment, would be foolhardy. The complexity that surrounds each of these variables requires deeper examination into how these factors affected the learning experience for each participant. The qualitative methods used in a focus group, or peer-to-peer discussion, can provide the appropriate environment and mechanisms to extrapolate this critical information from participants.

With respect to learning environment, a qualitative analysis can provide important context and meaning to participant experience's in both the virtual and face-to-face environment. Anecdotally, participants seem to prefer the face-to-face environment, but given the current state of health care in the United States, the move to virtual health care seems inevitable. Accordingly, capturing how students experienced interprofessional collaboration in both environments, and how it has translated to real clinical practice is crucial. With regard to gender and race/ethnicity, traditional quantitative methods, like the ICCAS, do very little to capture the influence of these factors. As evident in the literature, implicit and explicit bias based on gender and race/ethnicity can significantly influence the health care provider's experience in team-based environments. The qualitative approach can create an environment where participants can effectively express and elaborate on their experiences in the TEACH! curriculum from their own positionality and

perspective. This type of method can help identify pervasive issues that otherwise would not be captured with traditional quantitative analysis.

Clinical Relevance

The inclusion of IPE in the 2*020 Standards for Accreditation of Professional Athletic Training Programs* has created a complex challenge for athletic training educators and administrators. Currently, only slightly more than half of athletic training programs report that IPE activities are currently required in their didactic curriculum (Manspeaker et al., 2020). The integration of IPE is most challenging due to immense logistical considerations such as determining which health care disciplines to include, resources available (time, space, personnel), and overall institutional support (Manspeaker et al., 2020). Additionally, the lack of data on IPE learning outcomes among professional athletic training students makes developing and implementing IPE experiences even more challenging. Henceforth, this study provides a valuable contribution to the literature in determining best-practices for implementing IPE into athletic training curricula.

This study demonstrates that professional athletic training students who participated in the TEACH! curriculum not only self-reported improvements in overall interprofessional collaborative competency but did so uniformly across all of the IPEC core competencies. Accordingly, the TEACH! curriculum appears to be more effective in developing interprofessional collaborative competency than other strategies reported in the literature including case-based discussions, dedicated IPE courses, and single large-scale events. Therefore, when determining best-practices for IPE in athletic training curricula, the implementation of a series of large-scale events, similar to the design of the TEACH! curriculum, should be considered.

One of the most significant barriers to implementing IPE is the placement of IPE experiences in an already saturated curriculum. The creation, development, implementation, and assessment of IPE strategies currently used by many programs places a heavy burden on athletic training educators and administrators. This study demonstrates that professional athletic training student's involvement in an established IPE program, such as the TEACH! curriculum, is effective in developing interprofessional collaborative competency. Therefore, connecting athletic training programs to larger, established, IPE programs like the TEACH! curriculum can be an effective strategy to mitigate many of the hurdles that athletic training educators and administrators encounter in developing and implementing IPE.

This is the first study regarding IPE in the athletic training field to include learning environment, gender and race/ethnicity as variables in student learning outcomes. Notably, results show that gender and race/ethnicity did not influence participants self-reported interprofessional collaborative competency attainment. Seemingly, this an encouraging finding, but the lack of diversity within the population, and the small sample size, limits the ability to draw meaningful conclusions about the experiences of participants based on gender and race/ethnicity. However, the mere inclusion of these variables in this study is an important first-step in understanding how the positionality of professional athletic training students based on gender and race/ethnicity affect their ability to collaborate interprofessionally. Further, the inability to draw meaningful conclusions due to lack of diversity within the population highlights the need for more inclusion and diversity both within athletic training education and the athletic training profession at large.

The use of a virtual learning environment in the TEACH! curriculum in academic year 2019-2020 permitted the comparison of learning environments on interprofessional collaborative

competency attainment. Although results indicated that learning environment did not influence participant's competency attainment, the inclusion of environment in this study can facilitate the study of learning environment in future investigations. As health care increasingly incorporates more virtual models of health care delivery, educational strategies will likewise utilize more virtual and online environments. The inclusion of learning environment in this study as an outcome variable will contribute to the development of best-practices for IPE strategies in the athletic training field moving forward.

Conclusion

The results of this study indicate that the TEACH! curriculum is an effective strategy in improving interprofessional collaborative competency among professional athletic training students. In addition, participant's competency attainment does not appear to be influenced by learning environment, gender, or race/ethnicity. Results of this study coincide with previous investigations that report improvement in participant's interprofessional collaborative competency following IPE experiences, specifically as it pertains to understanding the roles and responsibilities of peer health care providers. Notably, this study also demonstrates that participation in the TEACH! curriculum uniformly improves other aspects of the IPEC core competencies including teams and teamwork, values and ethics, and interprofessional communication. Future investigations should consider expanding the participant pool, increasing frequency of ICCAS assessment, comparing the TEACH! curriculum to other IPE strategies, and exploring the translation of interprofessional collaborative competency to actual clinical practice in professional athletic training students. Despite limitations in population size, participant diversity, and a modified use of the ICCAS, results of this study contribute significantly to the development of best-practices for IPE in the athletic training field.

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Appendix A

Table A1

TEACH! 2.0 Competencies: Exposure Level Anchors 1 and 2

IPEC Core Competencies	Outcomes
Values / Ethics	Recognize that healthcare includes individuals, populations and communities.
	Recognize the value of diversity and individual differences to improve outcomes relevant to prevention and healthcare.
	Demonstrate respect for the unique cultures, values, roles/responsibilities, contributions, and expertise of professions.
Roles / Responsibilities	Communicate one's professional roles, responsibilities, and contributions to others.
	Recognize one's limitations in skills, knowledge, and abilities.
	Describe how the team works together to improve health, healthcare, and community outcomes and prevent disease.
	Recognize that individuals, populations and communities must have a voice in decisions that affect them.
Interprofessional Communication	Communicate the importance of teamwork in person-centered and community-focused care.
	Listen actively, and encourage ideas and opinions of others.
Teams and Teamwork	Describe the process of team development and the characteristics and practices of effective teams.
	Reflect on individual and team performance.
	Recognize that all members of the healthcare team share accountability to improve outcomes relevant to prevention and healthcare.

Table A2

TEACH! 2.0 Competencies: Immersion Level Anchors 3 and 4

IPEC Core Competencies	Outcomes
Values / Ethics	Work in cooperation with those who receive care, those who provide care, and others who contribute to or support the delivery of prevention and health services and programs.
	Respect the dignity and privacy of patients, clients and community members while maintaining confidentiality in the delivery of team based care.
	Act with honesty and integrity in relationships with patients, clients, community members, and other team members.
Roles / Responsibilities	Explain the roles, responsibilities, and contributions of other care providers and how the team can work together to optimize individual and population health and healthcare outcomes.
	Communicate with team members to clarify each member's responsibility in executing components of a treatment plan or public health intervention.
	Facilitate unique and complementary abilities of other team members to optimize health, healthcare, and service outcomes.
Interprofessional Communication	Choose effective communication tools and techniques, including the use of information systems and communication technologies, to facilitate discussion and interactions that enhance team function.
	Communicate information with patients, families, community members, and health team members in a manner that is understandable, avoiding discipline-specific terminology when possible.
	Use respectful language, attending to individual and team needs within a given situation, crucial conversation, or conflict.
Teams and Teamwork	Engage other professionals appropriate to the specific care situation to participate in shared patient-, client-, community-, and population focused problem solving.
	Reflect on individual and team performance for individual and team performance improvement.
	Use available evidence to inform effective teamwork and team-based practices.
	Work to develop consensus on the ethical principles to guide all aspects of teamwork.

Table A3

TEACH! 2.0 Competencies: Entry-to-Practice Level Anchors 5 and 6

IPEC Core Competencies	Outcomes
Values / Ethics	Place individual, population, and community interests at the center of interprofessional health, healthcare, and service delivery.
	Demonstrate high standards of ethical conduct in quality of care and community health services.
	Manage ethical dilemmas specific to interprofessional individual/community/population-centered care situations.
	Demonstrate competence in one's own profession appropriate to scope of practice.
	Develop a trusting relationship with patients, families, communities and other team members
Roles / Responsibilities	Engage diverse professionals who complement one's own professional expertise, as well as associated resources, to develop strategies to meet specific health and healthcare needs of individuals and populations.
	Forge interdependent relationships with other professions within and outside of the health system to improve collaboration and advance learning.
	Use the full scope of knowledge, skills, and abilities of professionals from health and healthcare workers to provide care and services that are safe, timely, efficient, effective, and equitable.
Interprofessional Communication	Express one's knowledge and opinions to team members involved in client care and population health improvement with confidence, clarity, and respect, working to ensure common understanding of information, treatment, interventions, and/or health service decisions.
	Recognize how one's uniqueness including experience level, expertise, culture, power, and hierarchy within the healthcare.
	Team contributes to effective communication, conflict resolution, negotiation, priority setting, and positive IP working relationships.
Teams and Teamwork	Integrate the knowledge and experience of health and other professions appropriate to the specific care situation—to inform care decisions; respecting patient, client, and community values and priorities and preferences for care.
	Engage self and others to constructively manage disagreements about values, roles, goals, and actions that arise among health and other professionals and with patients, families, and community members.
	Use process improvement strategies to increase the effectiveness of interprofessional teamwork and team-based services and programs.
	Apply leadership practices that support collaborative practice and team effectiveness.
	Engage self and others in collaboration that supports reconciliation of community priorities with individual needs (i.e., transplant v. community screening and prevention).

Appendix B

Figure B1

The Interprofessional Collaborative Competency Attainment Scale (Revised)

Using the following scale, please rate your ability for each of the following statements:

1 = "Poor"; 2 = "Fair"; 3 = "Good"; 4 = "Very good"; 5 = "Excellent"

	Before participating in the learning activities, I was able to:					After participating in the learning activities, I was able to:				
	P	F	G	VG	E	P	F	G	VG	E
1. Promote effective communication among members of an interprofessional (IP) team	1	2	3	4	5	1	2	3	4	5
2. Actively listen to IP team members' ideas and concerns	1	2	3	4	5	1	2	3	4	5
3. Express my ideas and concerns without being judgmental	1	2	3	4	5	1	2	3	4	5
4. Provide constructive feedback to IP team members	1	2	3	4	5	1	2	3	4	5
5. Express my ideas and concerns in a clear, concise manner	1	2	3	4	5	1	2	3	4	5
6. Seek out IP team members to address issues	1	2	3	4	5	1	2	3	4	5
7. Work effectively with IP team members to enhance care	1	2	3	4	5	1	2	3	4	5
8. Learn with, from and about IP team members to enhance care	1	2	3	4	5	1	2	3	4	5
9. Identify and describe my abilities and contributions to the IP team	1	2	3	4	5	1	2	3	4	5
10. Be accountable for my contributions to the IP team	1	2	3	4	5	1	2	3	4	5
11. Understand the abilities and contributions of IP team members	1	2	3	4	5	1	2	3	4	5
12. Recognize how others' skills and knowledge complement and overlap with my own	1	2	3	4	5	1	2	3	4	5
13. Use an IP team approach with the patient to assess the health situation	1	2	3	4	5	1	2	3	4	5
14. Use an IP team approach with the patient to provide whole person care	1	2	3	4	5	1	2	3	4	5
15. Include the patient/family in decision-making	1	2	3	4	5	1	2	3	4	5
16. Actively listen to the perspectives of IP team members	1	2	3	4	5	1	2	3	4	5
17. Take into account the ideas of IP team members	1	2	3	4	5	1	2	3	4	5
18. Address team conflict in a respectful manner	1	2	3	4	5	1	2	3	4	5
19. Develop an effective care plan with IP team members	1	2	3	4	5	1	2	3	4	5
20. Negotiate responsibilities within overlapping scopes of practice	1	2	3	4	5	1	2	3	4	5

21. Compared to the time before the learning activities, would you say your ability to collaborate interprofessionally is... (circle one)

1 = Much better now; 2 = Somewhat better now; 3 = About the same; 4 = Somewhat worse now; 5 = Much worse now

The ICCAS was developed by: MacDonald, C., Archibald, D., Trumpower, D., Casimiro, L., Cragg, B., & Jelly, W. (2010). Designing and operationalizing a toolkit of bilingual interprofessional education assessment instruments. *Journal of Research in Interprofessioanl Practice and Education, 1(3).* Revised item scales and the addition of item #21 were made during a replication validation study by Schmitz, C.C., Radosevich, D.M., Jardine, P.J., MacDonald, C.J., Trumpower, D. & Archibald, D. (2017, Journal of Interprofessional Care).

Appendix C

Table C1

ICCAS Overall Mean Score

Variable	N		M		SD		*t*	*df*	Sig. (2-tailed)	Cohen's *d*	Difference
	Pre	*Post*	*Pre*	*Post*	*Pre*	*Post*					
Pre Assessment *Post Assessment	31	31	3.69	4.41	.755	.531	-7.41	30	.001*	1.33	Large

*p<.01

Table C2

ICCAS Overall Mean Scores by Item

ICCAS Item	N		M		SD		*t*	*df*	Sig. (2-tailed)	Cohen's *d*	Difference
	Pre	*Post*	*Pre*	*Post*	*Pre*	*Post*					
Promote effective communication among members of an interprofessional (IP) team	31	31	3.64	4.3	.877	.652	-5.78	30	.001*	1.03	Large
Actively listen to IP team members' ideas and concerns	31	31	3.8	4.35	.872	.660	-4.24	30	.001*	.75	Large
Express my ideas and concerns without being judgmental	31	31	3.67	4.35	.871	.660	-5.04	30	.001*	.90	Large
Provide constructive feedback to IP team members	31	31	3.64	4.25	.914	.630	-5.11	30	.001*	.91	Large
Express my ideas and concerns in a clear, concise manner	31	31	3.67	4.38	.908	.667	-5.70	30	.001*	1.02	Large
Seek out IP team members to address issues	31	31	3.48	4.35	.995	.660	-6.35	30	.001*	1.14	Large
Work effectively with IP team members to enhance care	31	31	3.64	4.41	.877	.564	-6.44	30	.001*	1.15	Large
Learn with, from and about IP team members to enhance care	31	31	3.64	4.41	.877	.569	-5.99	30	.001*	1.07	Large
Identify and describe my abilities and contributions to the IP team	31	31	3.70	4.38	.824	.667	-5.04	30	.001*	.90	Large
Be accountable for my contributions to the IP team	31	31	3.77	4.45	.844	.623	-5.04	30	.001*	.90	Large
Understand the abilities and contributions of IP team members	31	31	3.67	4.48	.791	.676	-6.38	30	.001*	1.14	Large
Recognize how others' skills and knowledge complement and overlap with my own	31	31	3.64	4.41	.838	.620	-6.44	30	.001*	1.15	Large
Use an IP team approach with the patient to assess the health situation	31	31	3.74	4.38	.773	.667	-5.43	30	.001*	.97	Large
Use an IP team approach with the patient to provide whole person care	31	31	3.74	4.41	.815	.620	-5.37	30	.001*	.96	Large
Include the patient/family in decision-making	31	31	3.77	4.45	.844	.567	-6.29	30	.001*	1.13	Large
Actively listen to the perspectives of IP team members	31	31	3.70	4.48	.863	.569	-5.65	30	.001*	1.01	Large
Take into account the ideas of IP team members	31	31	3.74	4.48	.773	.625	-5.66	30	.001*	1.01	Large
Address team conflict in a respectful manner	31	31	3.80	4.41	.792	.620	-5.11	30	.001*	.91	Large
Develop an effective care plan with IP team members	31	31	3.74	4.54	.773	.567	-6.38	30	.001*	1.19	Large
Negotiate responsibilities within overlapping scopes of practice	31	31	3.64	4.38	.838	.558	-6.54	30	.001*	1.17	Large

*p<.01

Table C3

ICCAS Overall Mean Score 2019 vs. 2020 Cohort

Variable	N		M		SD		*t*	*df*	Sig. (2-tailed)	Cohen's *d*	Difference
	Pre	*Post*	*Pre*	*Post*	*Pre*	*Post*					
2019 Pre Assessment*Post Assessment	16	16	3.74	4.35	.736	.499	-4.92	15	.001*	.88	Large
2020 Pre Assessment*Post Assessment	15	15	3.64	4.47	.797	.575	-5.58	14	.001*	1.01	Large

*p<.01

Table C4

ICCAS Overall Mean Pre/Post Scores 2019 vs. 2020 Cohort

Variable	N		M		SD		*t*	*df*	Sig. (2-tailed)	Cohen's *d*	Difference
	'19	*'20*	*'19*	*'20*	*'19*	*'20*					
Pre Assessment 2019 * 2020	16	15	3.74	3.64	.736	.797	.376	29	.710	.067	Small
Post Assessment 2019 * 2020	16	15	4.35	4.47	.499	.575	.573	29	.571	.10	Small

*p<.01

Table C5

ICCAS Overall Mean Score – Males v. Females

Variables	N		M		SD		*t*	*df*	Sig. (2-tailed)	Cohen's *d*	Difference
	Pre	*Post*	*Pre*	*Post*	*Pre*	*Post*					
Males Pre Assessment*Post Assessment	11	11	3.74	4.48	.758	.439	-3.87	10	.003*	.69	Medium
Females Pre Assessment* Post Assessment	20	20	3.67	4.37	.771	.583	-6.35	19	.001*	1.14	Large

*p<.01

Table C6

ICCAS Overall Pre/Post Scores Male vs. Females

Variables	N		M		SD		*t*	*df*	Sig. (2-tailed)	Cohen's *d*	Difference
	Male	*Female*	*Male*	*Female*	*Male*	*Female*					
Pre Assessment Male * Female	11	20	3.74	3.67	.758	.771	.262	29	.795	.047	Small
Post Assessment Male * Female	11	20	4.48	4.37	.439	.583	.529	29	.601	.094	Small

*p<.01

Table C7

ICCAS Overall Mean Score White vs. Racial/ Ethnic Minority

Variables	N		M		SD		*t*	*df*	Sig. (2-tailed)	Cohen's *d*	Difference
	Pre	*Post*	*Pre*	*Post*	*Pre*	*Post*					
White Pre Assessment *Post Assessment	24	24	3.71	4.38	.732	.546	-6.00	23	.001*	1.07	Large
Racial/Ethnic Minority Pre Assessment *Post Assessment	7	7	3.62	4.5	.888	.507	-4.53	6	.004*	.81	Large

*p<.01

Table C8

ICCAS Overall Pre/Post Scores White vs. Racial / Ethnic Minority

Variables	N		M		SD		*t*	*df*	Sig. (2-tailed)	Cohen's *d*	Difference
	White	*Minority*	*White*	*Minority*	*White*	*Minority*					
Pre Assessment White*Racial/Ethnic Minority	24	7	3.71	3.62	.732	.888	.267	29	.791	.047	Small
Post Assessment White* Racial/Ethnic Minority	24	7	4.38	4.5	.546	.507	.486	29	.630	.087	Small

*p<.01

Appendix D

Figure D1

ICCAS Item #21-All Participants

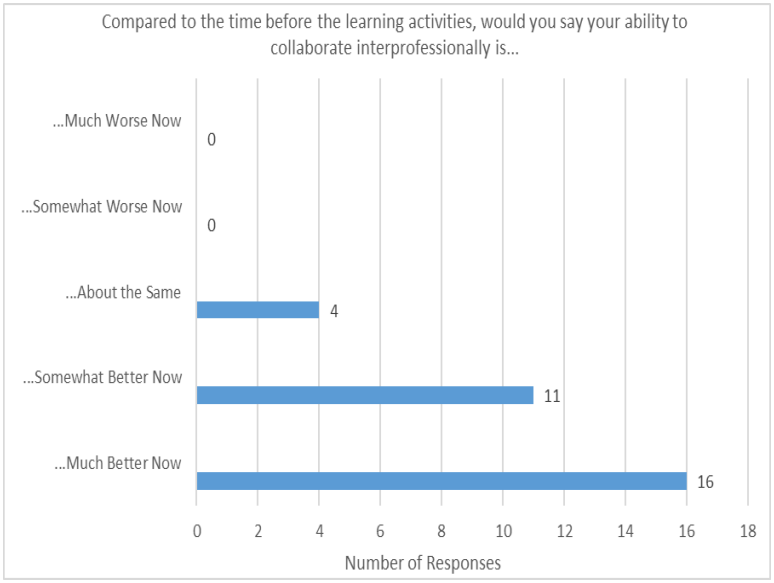


Figure D2

ICCAS Item #21-2019 vs. 2020 Cohort

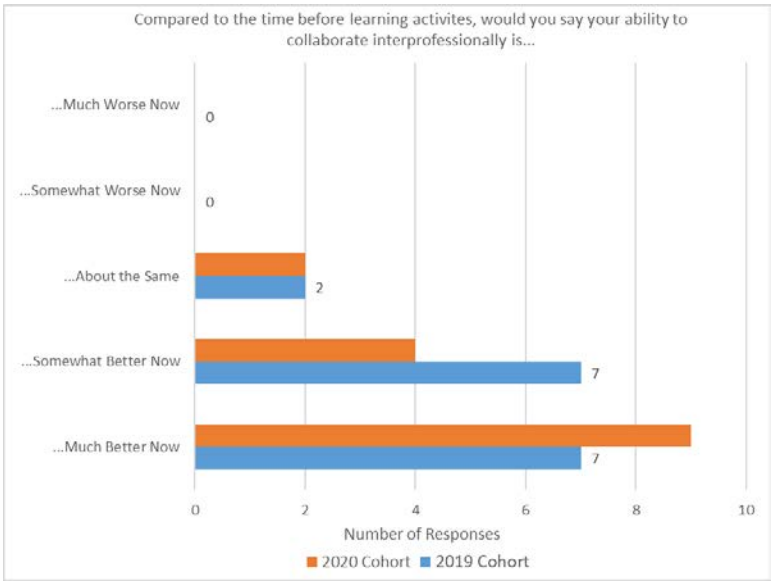


Figure D3

ICCAS Item #21-Male vs. Female

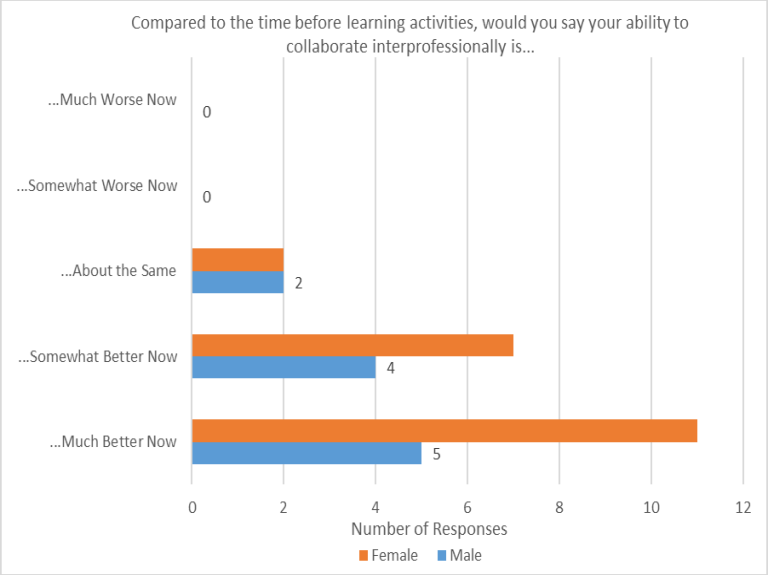
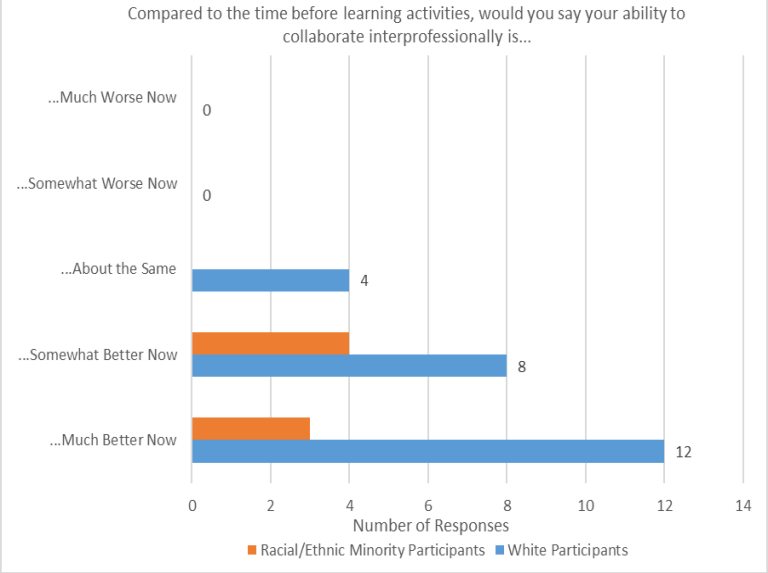


Figure D3

ICCAS Item #21-White vs. Ethnic Minority



Curriculum Vitae

Bradley W. Sage M.S. Ed., LAT, ATC

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EDUCATION

Doctor of Education in Higher Education: Indiana University, Bloomington, IN
December 2020
Program area of Higher Education
Dissertation Title: "*The Effectiveness Of The Team Education Advancing Collaboration In Healthcare (Teach!) Curriculum in Interprofessional Collaborative Competency Attainment Among Professional Athletic Training Students"*

Master of Science in Education: Old Dominion University, Norfolk, VA
Program area of Darden College of Education. Specialization in Athletic Training.
(NATA accredited Curriculum) May 2005
Thesis Title: "*The Immediate Effect of Cryotherapy at the Ankle Joint on Postural Control"*

Bachelors of Science in Sports Medicine: Mercyhurst College, Erie, PA
Program area of Sports Medicine. Specialization in Athletic Training.
(CAATE accredited curriculum) May 2003

PROFESSIONAL EXPERIENCE

Indiana University, Bloomington, Indiana
2016 – Present Senior Lecturer, Program Director, Athletic Training, UG Faculty
2014 – 2016 Lecturer, Clinical Education Coordinator; Athletic Training, UG Faculty

Mercyhurst University, Erie, PA
2005 – 2014 Lecturer, UG Faculty, Assistant Athletic Trainer,
Co-Director of Sports Medicine Research, Clinical Preceptor

Norview High School, Norfolk, VA
2003 – 2005 Head Athletic Trainer, (All Sports)

TEACHING

A. COURSES TAUGHT

Indiana University, Department of Kinesiology

Graduate Courses

SPH A501	Introduction to Clinical Practice in Athletic Training
SPH A510	Emergency Response for the Athletic Trainer
SPH A520	Therapeutic Interventions I
SPH A530	Therapeutic Interventions II
SPH A511	Applied Clinical Practice I
SPH A521	Applied Clinical Practice II
SPH A531	Applied Clinical Practice III

Undergraduate Courses

SPH K391	Biomechanics
SPH A494	Senior Seminar in Athletic Training
SPH A490	Administration & Management in Athletic Training
SPH A384	Principles & Techniques of Therapeutic Exercise
SPH A265	Athletic Training Education I
SPH A365	Athletic Training Education II
SPH A465	Athletic Training Education III
SPH A269	Clinical Education I
SPH A381	Clinical Education III
SPH A382	Clinical Education IV
SPH A481	Clinical Education V
SPH A482	Clinical Education VI

Mercyhurst University, Department of Sports Medicine

Undergraduate Courses

GSD 101	Freshman Year Initiative
SPMD 155	Personal Health Science
SPMD 157	Emergency Athletic Injury Management
ATR 158	Freshman Clinical Proficiency Lab I
ATR 159	Freshman Clinical Proficiency Lab II
SPMD 200	Athletic Training Field Experience I
SPMD 201	Clinical Education I
SPMD 202	Clinical Education II
SPMD 206	Clinical Education VI
SPMD 262	Assessment & Injury Management II
SPMD 264	Assessment & Injury Management III
SPMD 267	Therapeutic Modalities
SPMD 268	Therapeutic Modalities Lab
SPMD 300	Athletic Training Field Experience II
SPMD 322	Community Health
SPMD 364	Athletic Training Administration & Management
SPMD 464	Medical Terminology
ATR 480	Research Methods I

ATR 481 Research Methods II
ATR 482 Research Methods III

B. CURRICULUM DEVELOPMENT

Indiana University, Department of Kinesiology
Professional Athletic Training Program (BS)

SPH A265 Athletic Training Education I
SPH A365 Athletic Training Education II
SPH A465 Athletic Training Education III
SPH A494 Senior Seminar in Athletic Training

Professional Athletic Training Program (MSAT)

SPH-A 510 Emergency Response for the Athletic Trainer
SPH-A 520 Principles & Techniques of Therapeutic Intervention I
SPH-A 530 Principles & Techniques of Therapeutic Intervention II
SPH-A 540 Orthopedic Principles of Musculoskeletal Injuries I
SPH-A 550 Orthopedic Principles of Musculoskeletal Injuries II
SPH-A 560 General Medical Conditions in Athletic Healthcare
SPH-A 570 Healthcare Organization & Administration
SPH-A 512 Critical Inquiry in Athletic Healthcare I
SPH-A 522 Critical Inquiry in Athletic Healthcare II
SPH-A 532 Critical Inquiry in Athletic Healthcare III
SPH-A 542 Critical Inquiry in Athletic Healthcare IV
SPH-A 501 Introduction to Clinical Practice in Athletic Training
SPH-A 511 Applied Clinical Practice in Athletic Training I
SPH-A 521 Applied Clinical Practice in Athletic Training II
SPH-A 531 Applied Clinical Practice in Athletic Training III
SPH-A 541 Applied Clinical Practice in Athletic Training IV

Mercyhurst University, Sports Medicine Department

SPMD 200 Athletic Training Field Experience I
SPMD 300 Athletic Training Field Experience II
SPMD 364 Athletic Training Administration & Management
SPMD 464 Medical Terminology

C. MASTERS THESIS COMMITEES

Indiana University, Department of Kinesiology, Masters' Thesis Committee Member

2016 – Garrett Huber, "*Lower Extremity Postural Alignment without Decreasing Functional Performance.*"

PROFESSIONAL SERVICE

A. PROFESSIONAL ORGANIZATION SERVICE ACTIVITIES

Professional Athletic Training Program Site Visitor, Commission on Accreditation of Athletic Training Education, 2015 – Present

Moderator, Great Lakes Athletic Trainers' Society Symposium, Chicago, IL, March 2016

Member, Great Lakes Athletic Trainers' Society Student Research Review Committee; 2015

B. UNIVERSITY SERVICE ACTIVITY

Indiana University

Interprofessional Practice and Education South Central-Bloomington Faculty Working Group
Member, 2016 – present

Interprofessional Practice and Education Center
Teach! Curriculum Facilitator, 2017-present

Interprofessional Practice and Education Center
Teach! Curriculum Content Leader, 2017-present

Bloomington Faculty Council
Member, Student Affair Committee, 2016

Member, Recreational Sports Facility, 2016

Kinesiology Department
Chair, Athletic Training Education Committee, 2016-2017, 2019

Faculty Advisor, Athletic Training Student Council, 2014 – 2017

Member, Undergraduate Studies Committee, 2017-2018

Member, Graduate Studies Committee, 2018-2019

Mercyhurst University

Mercyhurst University Faculty Senate
Co-Chair, Sport Medicine Undergraduate Research Committee, 2005-2014

Advisor, Iota Tau Alpha, 2006-2014

Member, Sexual Harassment Committee, 2008-2014

Member, Institutional Review Board, 2006 - 2014

Member, Rank & Tenure Committee, 2008-2011

C. MEMBERSHIPS AND CERTIFICATIONS

National Athletic Trainers' Association. Membership #993850
NPI # 1063798429

Great Lakes Athletic Trainers' Association

Indiana Athletic Trainers' Association

National Athletic Trainers' Association Certified Athletic Trainer. Certification #070302222

Licensed Athletic Trainer, State of Indiana. License #36002345A

American Red Cross Instructor

Graston Technique M1 Certified

FMS Level 1 Certified

D. HONORS AND AWARDS

Old Dominion University Excellence in Athletic Training Award, 2005

RESEARCH

PUBLICATIONS

1. Hueber, G. A., Hall, E. A., **Sage, BW**., & Docherty, C. L. (2017). Prophylactic Bracing Has No Effect on Lower Extremity Alignment or Functional Performance. *International journal of sports medicine*, *38*(08), 637-643.

2. **Sage BW**. Teaching Health Care Administration in Athletic Training: A Unique Approach. Athl Train Educ J. 2013; 8(3):71–73.

PRESENTATIONS

1. **Sage, BW.** Preserving Sport in Modern Society. Vigo County Public Library: Hard Hitting Topics: Sports in Our Community, Invited Oral Presentation, Terra Haute, IN. March 15th, 2019

2. **Sage, BW.** Implementing Interprofessional Education into Athletic Training Curricula: The TEACH! Curriculum. Athletic Training Educator's Conference, Poster Presentation, Dallas, TX. February, 15th 2019

3. **Sage, BW**. Documenting Teaching Excellence. CITL Non-tenure Track Faculty Development Conference, Invited Oral Presentation, Bloomington, IN. January 5th, 2018

4. **Sage, BW**, Scriver, O., Hojas, V., Rodriguez, SB, Kavousian, S. Transforming Teaching & Learning through Feedback. FACET retreat, Oral Presentation, Nashville, IN. May 21, 2017.

5. **Sage, BW**. Athletic Training Professional Degree Transition at Indiana University. Indiana University Athletics Department Meeting, Invited Oral Presentation, Bloomington, IN. December 14th, 2016

6. **Sage, BW**. Athletic Training Professional Degree Transition at Indiana University. Indiana University Athletics Department Meeting, Invited Oral Presentation, Bloomington, IN. September 24th, 2018

7. **Sage, BW**. Athletic Training Professional Degree Transition at Indiana University. Current Topics in Athletic Training Course, Invited Oral Presentation, Bloomington, IN. February10th, 2017

8. **Sage, BW**. Athletic Training Professional Degree Transition at Indiana University. Current Topics in Athletic Training Course, Invited Oral Presentation, Bloomington, IN. October 4th , 2018

9. **Sage, BW**. Teaching Administration & Management in Athletic Training: A Novel Approach. NATA Annual Meeting & Clinic Symposia, Oral Presentation, St. Louis, MO. June 2012

10. **Sage, BW**. Current and innovative Trends in Sports Medicine: LASER Therapy. Mercyhurst University Research Symposium, Oral presentation, Erie, PA. March 2010

11. **Sage, BW**, Van Lunen, BL, Onate, J, Arnold, B. The Immediate Effect of Cryotherapy at the Ankle Joint on Postural Control. NATA Annual Meeting & Clinic Symposia, Oral presentation, Atlanta, GA. June 2006

12. **Sage, BW**, Van Lunen, BL, Onate, J, Arnold, B. The Effect of Cryotherapy on the Neuromuscular System. MAATA Annual Meeting & Clinic Symposia, Oral Presentation, Virginia Beach, VA. May 2005